SANDAKANIA 21 (2016): 131–169

The parasitic plant families Loranthaceae and Viscaceae in Sabah, Malaysia

Todd J. Barkman[1], Rimi Repin[2] & John B. Sugau[3]

[1] Department of Biological Sciences,
Western Michigan University, Kalamazoo, MI 49008, U.S.A.
todd.barkman@wmich.edu

[2] Sabah Parks, P.O. Box 10626,
88806 Kota Kinabalu, Sabah, Malaysia.

[3] Forest Research Centre, Sabah Forestry Department,
P.O. Box 1407, 90715 Sandakan,
Sabah, Malaysia.

Summary. We report 52 species of Loranthaceae and Viscaceae occurring in Sabah, Malaysia based on study of more than 800 specimens and extensive field work. A new species of *Macrosolen* endemic to Mount Tambuyukon is described. The 52 species reported more than doubles the number previously reported from Mount Kinabalu, with most of the non-Kinabalu species occurring at low elevations, particularly in East Sabah. We also report three new records (*Helixanthera pulchra*, *Korthalsella japonica* and *Viscum scurruloideum*) for Borneo in addition to six new records for Mount Kinabalu (*Amylotheca duthieana*, *Elytranthe albida*, *Korthalsella geminata*, *Lepidaria kingii*, *Viscum nepalense* and *Viscum scurruloideum*). A characteristic feature of the mistletoe flora of Sabah is that numerous species are known from only a few collections. The apparent rarity of many plant species in tropical rainforests substantially challenges our abilities to accurately inventory these diverse regions.

Loranthaceae and Viscaceae are two diverse parasitic families in Sabah. Both are twig epiphytes or occasionally hyperparasites on various woody hosts. Neither family displays a high degree of host specificity although a few species may be found predominantly, or exclusively, on one or a couple of host species. Both families are members of Santalales, which includes both root and shoot parasites as well as non-parasitic plants. Three additional families of the order, Santalaceae, Olacaceae, and Opiliaceae, do occur in Sabah but are not

discussed in this treatment because they were recently covered in the Tree Flora of Sabah & Sarawak (Chua 1996). The species reported here are distributed at elevations from sea level to as high as 3400 m. Many species appear to be restricted to primary vegetation while others are found predominantly in secondary or disturbed forest settings. Host information is lacking for most of the specimens we observed and it is hoped that future collections will attempt to provide these data when possible.

The most recent treatment of both families was that of Barlow (1997a, b). That comprehensive treatment for the entire Flora Malesiana region included descriptions of species and general distributions. Thus, the primary purpose of this work is to specifically detail the diversity and geographic distribution of Loranthaceae and Viscaceae in Sabah, Malaysia (northern Borneo). Checklists of the species of Loranthaceae and Viscaceae occurring on Mount Kinabalu were published as recently as 2001 and 2004, respectively ((Beaman et al. 2001, Beaman & Anderson 2004). We used those works as nuclei for our expanded study of the two families thoughout Sabah. It is remarkable that although the treatment for Mount Kinabalu was based on extensive specimen citations, we report six additional species to add to the 24 species included in those treatments, a 25% increase. No key to species is provided in this treatment because the Barlow keys are useful and complete in most cases; however, *Dendrophthoe* and *Macrosolen* require revision.

VISCACEAE IN SABAH: *GINALLOA*, *KORTHALSELLA*, *NOTOTHIXOS* AND *VISCUM*

The 10 species in this family reported in Sabah can usually be easily separated from Lorathaceae by fact that no secondary haustoria are formed and the flowers lack a colourful corolla. Barlow also uses persistent tepals on fruits as a useful character to separate species of the families when flowers are not present. This family is not terribly well-collected in Sabah but a total of 58 specimens were studied here. The fact that all are stem/twig parasites and often grow high in the canopy of lowland and montane forests may be the primary reason for the paucity of collections. Seven out of 10 (70%) species reported here are known from less than five collections in Sabah. We report two new records for Borneo (*Korthalsella japonica* and *Viscum scurruloideum*). The report of *K. japonica* from Borneo is not surprising given its otherwise very widespread distribution in Malesia. *Viscum scurruloideum* was previously only reported from Java. Three of the reported species represent new records for Mount Kinabalu thereby nearly doubling the previous number reported (Beaman & Anderson 2004).

1. *Ginalloa arnottiana* Korth.

This species bears vegetative resemblance to some *Viscum* species like *V. ovalifolium*, yet, its elongate inflorescences (3–9 cm long) allow for immediate distinction. It is found at sites distributed throughout much of Sabah with recorded hosts being *Schima* (Theaceae) and *Parinari* (Chrysobalanaceae).

Elevational range: 700–1800 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Kota Belud, Mt. Kinabalu, *Berhaman SAN 134886*, 16 September 1993 (SAN); Beluran, Sugut FR, , *Meijer SAN 27650a*, 6 October 1961 (K, L, SAN, SAR); Ranau, Bukit Kolong, *Singh SAN 28316*, 20 November 1964 (K, L, SAN); Tenom, Crocker Range, 9 Disember 1962, *Mikil SAN 31939* (SAN); Penampang, *Cockburn SAN 65467*, 13 October 1969 (K, L, SAN); Ranau, Kundasang, *Sario SAN 28965*, 31 January 1964 (SAN); Tenom, *Meijer SAN 43916*, 22 June 1964 (K, SAN); Nabawan, Sapulut FR, *Sumbing SAN 101326*, 19 October 1983 (SAN); Tawau, Tawau Hill Park, *Aban SAN 79777*, 17 July 1974 (SAN); Ranau, Mamut, *Gambating* SAN 114300, 22 April 1986 (SAN); Ranau, *Gambating SAN 129227*, 13 June 1989 (SAN); Keningau, *Fidilis SAN 118816*, 21 May 1987 (SAN); Pun Batu, Pensiangan, *Berhaman A. Berhaman 126*, 24 Oct 1996 (SAN); Lohan River, 700-750m, *Beaman J., J. H. Beaman 9074*, 24 Mar 1984 (UKMB).

2. *Ginalloa nuda* Danser

No specimens were observed for this species but Beaman and Anderson (2004) cite collections from BO, BM, K. The type is from Mount Kinabalu and it appears to be endemic there. No collections have been made since the Clemenses collected it four times in the 1930s. All of those specimens, including the type, are from either Penigupan ('Penibukan') or the adjacent Tahubang River. Intensive collecting at Penigupan may result in its rediscovery because the habitat is largely intact for the elevations recorded by the Clemenses.

Elevational range: 900–1500 m (from Beaman & Anderson 2004).

SPECIMENS EXAMINED: none.

3. *Korthalsella japonica* (Thunb.) Engl.

This appears to be a new record for Borneo. While many *Korthalsella* species are difficult to distinguish, the identity of this specimen is clear because the flowers are produced in flattened, not terete, spicate conflorescences, thereby excluding both *K. papuana* and *K. geminata*. The plants are longer than 3 cm but less than 10 cm long thus excluding *K. dacrydii* and *K. rubra*. The specimen was collected from heath forest in Taman Sumaki, Sipitang. Anthea Phillips (pers. comm.) reported having seen *Korthalsella* in nearby Long Pa Sia but we have not observed specimens from that locality.

Elevational range: around 1550 m.

SPESIMENS EXAMINED—BORNEO. SABAH: Sipitang, Meligan FR, *Sugau SAN 144717*, 14 April 2002 (K, L, SAN).

4. *Korthalsella geminata* (Korth.) Engl.

This represents a new record for the flora of Mount Kinabalu because it was collected from the contiguous Mount Tambuyukon of Kinabalu Park. The specimens were parasitizing *Leptospermum*, consistent with other reported Myrtaceae hosts (Barlow 1997). The small size of these plants makes them fairly inconspicuous and may explain the fact that the species escaped collection from the Kinabalu Park region over the past 100 years in spite of intense collecting efforts there. Alternatively, the paucity of collections of this species may indicate that it is truly localized and rare. The young fruits appear orange-red.

Elevational range: 2500–2700 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Mount Kinabalu, Bukit Babi 1250 m, *Van der Ent & Sukaibin SNP 19940*, 15 May 2011 (SNP); Mt. Tambuyukon, Plot 16, 2499 m, *Van der Ent, Cameron Kilquor, Rossiti, Sukaibin, Benedict et al. SNP 26012*, 4 May 2011 (SAN); Mt. Tambuyukon, Plot 16, 2499 m, *Van der Ent, Cameron Kilquor, Rossiti, Sukaibin, Benedict et al. SNP 26884*, 6 May 2011 (SAN).

5. *Notothixos sulphureus* Merr.

This species was collected from Mt. Trus Madi and Mt. Silam and is particularly striking due to the conspicuous orange-yellow dense indumentum found on the leaves and stems which make it hard to overlook, especially when young. The specimen *SAN 89529* has cream-coloured dendritic hairs that appear to be lost rather early in development because the fruiting individual was mostly glabrous. *Notothixos suphureus* is reported as having cream-coloured hairs that disappear at maturity so *SAN 89529* is probably best placed here. Further collecting of Mt. Silam is necessary to determine if the material represents a distinctive species. Additionally, since *Notothixos* has not been collected since 1988 it remains to be seen if it is still extant in Sabah. Although *N. floccosus* is known from Borneo, it differs by its much narrower leaves and shorter less floriferous inflorescence.

Elevational range: not given.

SPECIMENS EXAMINED—BORNEO. SABAH: Tambunan, Trus Madi, *Sumbing SAN 122148*, 10 August 1988 (SAN); Lahad Datu, Mt. Silam, *Madani SAN 89529*, 4 Januari 1979 (SAN).

6. *Viscum articulatum* Burm.f.

This species can be difficult to distinguish from specimens of *V. nepalense*. A discussion of differences between them follows below. The only recorded hosts are species of Santalaceae making it a hyperparasite, as has been reported previously (Barlow 1997). All of the specimens cited here are from low elevations in the state near Sandakan and Keningau.

Elevational range: none provided.

SPECIMENS EXAMINED—BORNEO. SABAH: Keningau, Trusmadi FR, *Bousi SAN 123999*, 4 May 1988 (SAN); Sabah, s.n., *SAN 55011*, 1965 (SAN); Sandakan, Sepilok FR, *Meijer SAN 24906*, 20 April 1961 (K, L, SAN); Sandakan, Leila FR, *P.F. Stevens et al. 708*, 29 January 1976 (SAN); Sandakan, Leila FR, *Kumin SAN 74164*, 18 August 1971 (SAN); Sandakan, Leila FR, *Meijer SAN 37868*, 17 August 1963 (SAN).

7. *Viscum nepalense* Spreng. (Fig. 1)

This is a new record for Mt. Kinabalu. This species and *V. articulatum* are difficult to distinguish but the usually sharply quadrangular stems of *V. articulatum* make it possible to distinguish from *V. nepalense*, which has wider flattened stems. Even when internodes of *V. articulatum* are flattened in herbarium specimens, they have an angular ridge making them distinguishable from *V. nepalense* which lacks the ridge on its narrow, flattened stems. In addition, *V. articulatum* is reported to have white fruits while those of *V. nepalense* are yellow. Whether *V. articulatum* and *V. nepalense* are sufficiently distinctive to warrant species status requires future study.

Elevational range: around 1500 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Bundu Tuhan, Rangkam, 1100 m, *T.J. Barkman SNP 15594*, 22 Sep 2000 (SNP).

8. *Viscum ovalifolium* DC. (Fig. 2)

This is the most commonly encountered species of the family in the state and it is often found in secondary forest. The warty fruits (at least when young) and broad ovate leaves make this species distinctive in the genus, at least in Sabah. It is reported as parasitic on Tarap (*Artocarpus*, Maraca).

Elevational range: 500–1400 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Bundu Tuhan, 4000 ft, *Ansoe & Lucas Tinggal SNP 3403*, 9 Jul 1987 (SNP); Bundu Tuhan, 1400 m, *Todd Barkman SNP 15901*, Nov 1999 (SNP); Nabawan, Sapulut FR, *Fidilis SAN 101318*, 18 Mar 1983 (SAN); Tenom, Tomani, *Talip SAN 50563*, 20 Oct 1966 (K, L, SAN); Papar, Mandahan, *Madani SAN 122874*, 26 Jan 1990 (SAN); Ranau, Mamut Cooper Mine, *Gambating SAN 105605*, 17 Mar 1986 (SAN); Ranau, Peransangan, *Gambating SAN 117846*, 14 Mar 1987 (SAN); Ranau, Bundu Tuhan, *Maikin SAN 110001*, 14 Aug 1985 (SAN); Ranau, *Gambating SAN 121624*, 22 Jul 1988 (SAN); Ranau, Takutan, *Shea SAN 77141*, 23 May 1973 (SAN); Keningau, Witti Range, *Sumbing SAN 110184*, 23 Aug 1985 (SAN); Tambunan, Kiawayan, *Bousi SAN 113740*, 28 May 1986 (SAN); Tenom, Crocker Range (National Park), *Mikil SAN 31910*, 1 Nov 1962 (SAN); Tenom, Tomani, *Talip SAN 50563*, 20 Oct 1966 (K, L, SAN); Tenom, Mt.

(Above left and right) **Fig. 1.** *Viscum nepalense* stem showing yellow fruit which serves to distinguish it from *V. articulatum*. **Fig. 2.** *Viscum ovalifolium* with flowers and fruits. In Sabah, this species has the largest leaves in the genus. (Below left and right) **Fig. 3.** *Viscum scurruloideum* showing young fruits produced on an elongate stipe. **Fig. 4.** *Amyema beccarii* shown with its umbellate flowers.

Mandalom F.R, *Sumbing SAN 136124*, 14 Aug 1993 (SAN); Tenom, Tomani, *Madani SAN 90758*, 18 Jun 1976 (SAN); Tenom, *Mikil SAN 31946*, 10 Dec 1962 (K, L, SAN); Tambunan, *H.P. Nooteboom 1308*, 15 Mar 1969 (SAN); Ranau, Sosopodon, *Badak SAN 32307*, 5 Nov 1962 (K, L, SAN); Ranau, Badukan, *Gambating SAN 117950*, 17 Jun 1987 (SAN); Beluran, *Lideh SAN 55949*, 8 Dec 1983 (SAN); Papar, *Mikil SAN 30317*, 31 May 1962 (K, L, SAN); Tenom, Sapong, *Sadau SAN 42593*, 22 Mar 1965 (SAN); Keningau, Sungai Bersanon, *Asik SAN 128172*, 9 Aug 1990 (SAN); Tenom, Melalap, *Fidilis SAN 139186*, 6 Jul 1995 (SAN); Nabawan, Pensiangan Penantaman, *Sumbing SAN 131463*, 9 Jul 1991 (SAN); Lahad Datu, Danum Valley, *E.J.F. Campbell-Gasis 216*, 19 Feb 1992 (SAN); Kinabatangan, Pinangah, *Sumbing SAN 136828*, 9 Jul 1993 (SAN); Ranau, *Gambating SAN 116199*, 27 Aug 1986 (SAN).

9. *Viscum scurruloideum* Barlow (Fig. 3)

This is a new record for Borneo and Mount Kinabalu. Although this species could be mistaken for a narrow-leaved form of *V. ovalifolium*, the smooth fruits and falcatiform leaves and elongate inflorescence with lateral male flowers separate it from all other species in Borneo. Our plants fit the description for the species well, especially in the falcate shape of the leaves that are 0.7–1.0 cm wide (although this is slightly wider than stated in Barlow's key) and the 4-merous flowers. The single specimen was collected from secondary vegetation in the Mount Kinabalu area (Kg. Bundu Tuhan) and it appears to parasitize Tikalod (*Quercus*). Parasitism of Fagaceae is consistent with the recorded host in Java which is *Castanopsis* (Barlow 1997). Mature fruits need to be studied in order to discern whether the tepals are persistent in Sabah material.

Elevational range: 1300 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Hamadon, Kg. Bundu Tuhan, 1300 m, *T.J Barkman SNP 15591*, 22 Sep 2000 (SNP).

10. *Viscum wrayi* Gamble

The obovate to spathulate leaves make this species distinct from *V. ovalifolium* and all other species in the state. It is known from a single collection from the Maliau Basin.

Elevation: around 1050 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Maliau Basin, Jalan Babi, 1005 m, *Henry & Sidkan MB152*, 11 Apr 2000 (SAN).

LORANTHACEAE IN SABAH

This family is fairly commonly collected in Sabah due to the showy nature of the flowers that can approach 100 mm in length. The colourful tubular flowers of many species are reported to be bird pollinated. All species are twig epiphytes that may form secondary haustoria and in some cases it is not uncommon to see parasites covering large portions of their host stems. The fact that many are high-growing epiphytes makes collection and study difficult. Fourteen out of 42 (24%) species are only known from < 5 specimens. A few species previously reported from Mount Kinabalu (Beaman et al. 2001) were not seen in Malaysian collections at SAN or SNP: *Trithecanthera superba*, *Dendrophthoe quadrifida*, *Dendrophthoe lanosa*, and *Helixanthera spicata*. One new species is described from Mt. Tambuyukon of Kinabalu Park and three species are new records for the Kinabalu flora: *Amylotheca duthieana*, *Elytranthe albida*, and *Lepidaria kingii*. One species reported here, *Helixanthera pulchra*, appears to be

a new record for Borneo. In general, identification of species is critically dependent on the collection of flowering material because fruits are usually insufficient alone, particularly due to variation in leaf size and shape.

In Sabah, the genera are fairly distinct and reliably identified. Yet, care must be taken because some traits appear to have arisen independently in multiple genera. For instance, quadrangular (4-sided) stems have apparently arisen in *Barathranthus productus*, *Lepeostegeres lancifolius* and *Macrosolen platyphyllus*. Whorled leaves have evolved in *Amyema beccarii*, *Amylotheca dutheiana* and *Lampas elmeri*. Development of brown-black scales along margins of leaves and midribs has evolved in *Lampas elmeri*, *Lepeostegeres* and *Amylotheca*. Although they appear to have evolved by convergence, it is not clear what selective value these traits provide.

Amyema

1. *Amyema beccarii* (Tiegh.) Danser (Fig. 4)

This is a fairly common species distributed at a wide range of elevations. Sterile specimens of *A. beccarrii* could be mistaken for *Lampas elmeri* because of the 4 leaves/node with thickened laminas but the latter species has an acute leaf apex while those of *A. beccarrii* are normally rounded. The flowers measure 13–22 mm long with mostly free petals and are sessile at nodes. The flowers are normally red or rarely orange below with the apical ¼ of buds (the reflexed lobes of the corolla) green.

Elevational range: 2–2000 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Ranau, Nalumad, *Gambating SAN 114394*, 20 Jun 1986 (SAN); Nabawan, Pensiangan, Batu Punggul, *Kulip SAN 133505*, 28 Jan 1993 (SAN); Tambunan, Sungai Rampon, *Bousi SAN 123874*, Apr 1988 (SAN); Beaufort, Siaungau Forest Reserve, *Diwol SAN 78143*, 29 May 1974 (SAN); Beaufort, Binsulok FR, *Amin SAN 104138*, 20 Feb 1992 (SAN); Lahad Datu, Bukit Silam, *Wong WKM 2114*, 17 Apr 1992 (SAN); Kudat, Balambangan Island, *Stone SAN 86785*, 12 Apr 1977 (SAN); Kudat, Pulau Banggi Mangrove FR, *Sugau JBS 200*, 22 May 1996 (SAN); Beaufort, *Amin SAN 126350*, 24 Jun 1992 (SAN); Lahad Datu, Madai Caves, *Berhaman AB 87*, 10 Jun 1996 (SAN); Beaufort, Pimping, *Madani SAN 111368*, 10 Sep 1985 (SAN); Kinabatangan, Gunong Lotung, *Cockburn SAN 83293*, 17 May 1976 (SAN); Ranau, Bambangan, *Gambating SAN 118107*, 18 Jun 1987 (SAN); Beaufort, Binsulok FR, *Amin SAN 102589*, 28 Apr 1986 (SAN); Ranau, Sungai Segindai, *Gambating SAN 100216*, 23 Aug 1983 (SAN); Pitas, *Gambating SAN 121313*, 13 May 1987 (SAN); Kota Belud, Kinabalu National Park, *Chow SAN 76405*, 26 Sep 1972 (SAN); Kinabatangan, Dagat, *Ahwing SAN 35480*, 9 Apr 1963 (SAN); Lahad Datu, Pulau Tabawan, *Chai SAN 26686*, 18 Oct 1961 (SAN); Beaufort, Weston, *Aban SAN 66661*, 5 Dec 1969 (SAN); Penampang, Tamparuliyan FR, *Amin SAN 115579*, 23 Feb 1988 (SAN); Beaufort, Binsulok, *Amin SAN 98794*, 28 Jul

1993 (SAN); Kinabatangan, Bukit Tawai, 11 Apr 1994, *Sugau SAN 138843* (SAN); Ranau, Sungai Singgaron Baru, *Gambating SAN 114316*, 23 Apr 1986 (SAN); Ranau, *Soinin SAN 129142*, 27 Jul 1989 (SAN); Beluran, Labuk Sugut, Telupid, *Zainudin A. Zainudin 5035*, 11 Apr 1994 (SAN); Near Saat, Kg. Bundu Tuhan, 1400m, *Barkman T.J. Barkman 301*, 4 Dec 1997 (SNP); 3.5 km dari Melangkap Tomis, *Lugas PEK-L. Lugas 2128*, 12 May 1996 (SNP); Melangkap Tomis, Kawasan Taman, *Lugas PEK-L. Lugas 2551*, 7 Aug 1996 (SNP); tepi sungai Mekedau, Kg. Nalumad, *Andau PEK-D. Andau 164*, 8 May 1995 (SNP); Kg. Takutan, *Tadong PEK-D. Tadong 235*, 28 Mar 1993 (SNP); Kudat, Pingau-pingau, 10m, *Akin S. Akin 2475*, 16 Sep 1992 (UKMB); Kudat, XPDC Balambangan Island, mangrove forest, *Dolois, Park & Masius SNP 18705*, 26 May 2003 (SNP); Ranau, Summit of Mt. Mentapok, 1581 m, *Dolois, Park & Johnny SNP 09583*, 9 Jun 1999 (SNP); Saat, Kg. Bundu Tuhan, *T.J Barkman SNP 15590*, 22 Sep 2000 (SNP).

2. *Ameyema gravis* Danser

This is a mangrove species with small, obovate, opposite leaves and flowers that are up to 30 mm long.

Elevational range: none provided.

SPECIMEN EXAMINED—BORNEO. SABAH: XPDC Banggi Is., Penukaran Is., *Dolois S., Tisun G. & Bellia E. SNP 18832*, 27 Jul 2003 (SNP).

***Amyema* indet.**

There are other Bornean species not yet known from Sabah including *A. fasciculata* and *A. triantha*. Additional unidentified material at SAN is not referrable to either of them and thus may represent undescribed species. However, the material is insufficient for description at this time. The specimens include:
Lahad Datu, Ulu Segama FR, *Madani SAN 108710*, 10 Apr 1985 (SAN); Lahad Datu, Ulu Segama FR, *Madani SAN 108599*, 17 Mar 1985 (SAN); Tawau, Tawau Hill Park, *Madani SAN 111178*, 19 Oct 1985 (SAN); Beluran, Labuk Sugut, Segaliud Lokan FR, *Majawat SAN 125880*, 4 Oct 1988 (SAN); Kinabatangan, Tangkulap FR, *Gambating SAN 111673*, 5 Dec 1985 (SAN); Lahad Datu, Baturong Caves, *Berhaman AB 104*, 12 Jun 1996 (SAN); Kinabatangan, Lamag FR, 200m, *Pereira JTP 800*, 26 Apr 2001 (SAN).

Amylotheca

3. *Amylotheca duthieana* (King) Danser

This is a new record for Mount Kinabalu. Although not cited in Beaman et al. (2001), this species is known from one collection from Mt. Kinabalu and another from Tawau. It would

seem that this is a rare species in Sabah. This species is distinctive from others with its grey-green, glaucous leaves with a black petiole that are produced 3 per node (although they may be scattered even on the same stem). Leaf shape is also highly variable even on a single stem. The flowers appear to be mostly red. The only recorded host is Seraya tembaga (Dipterocarpaceae).

Elevational range: around 1000 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Tawau, Quoin Hill FR, *Aban SAN 30528*, 4 Jul 1962 (SAN); 100 m dari sempadan Taman, Melangkap Tomis, *Lugas PEK-L. Lugas 975*, 13 Sep 1995 (SNP).

Barathranthus

4. *Barathranthus productus* (King) Tiegh.

This species is distinctive for its opposite leaves that are produced on a sharply angled/ ridged stems that bear essentially sessile flowers. The *SAN 105298* specimen has particularly narrow leaves but cannot represent *B. axanthus,* the only other species of the genus known in Borneo, because of the 4-angled stems and long corollas. Additional targeted collecting and molecular analysis could bear on the question of whether there is more than one species of *Barathranthus* in Sabah. Since no specimens of this genus have been collected since 1988, it also remains to be seen if the species still exists in Sabah.

Elevational range: around 200 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Tambunan, Trus Madi FR, *Bousi SAN 124008*, 4 May 1988 (SAN); Keningau, Sapulut FR, Nabawan, *Fidilis SAN 105298*, 24 Jul 1984 (SAN); Lahad Datu, Pulau Baik, *Latiff A. Latiff 2889*, 27 Sep 1988 (UKMB).

Dendrophthoe

Material of this genus is fairly simply distinguishable from others in Sabah due to the alternate leaves and mostly 5-merous flowers that are borne singly with a solitary bract subtending them. However, the key provided in Barlow (1997) does not separate material very clearly for the Sabah collections, particularly for fruiting specimens since fruit features are not included in the key. Part of the confusion, even with flowering material, may be due to hybridization between several species (Barlow 1997). Most fruiting material is treated as *Dendrophthoe* indet. for the purposes of this study.

5. *Dendrophthoe clementis* (Merr.) Danser

Barlow (1997) describes this species as having acuminate anthers, white indumentum, leaves 5–10 cm long and a corolla that is > 30 mm. The specimens cited below are a bit short in

the corolla but otherwise fit nicely. The leaves are smaller and thinner than *D. constricta* and the styles seem persistent once the corolla falls. Also, the leaves do not have the strongly emergent venation of *D. constricta*. The only reported host is *Parashorea malaanonan* (Dipterocarpaceae).

Elevational range: not recorded.

SPECIMENS EXAMINED—BORNEO. SABAH: Lahad Datu, Mostyn, *Talip SAN 68337*, 16 May 1970 (SAN); Kinabatangan, Lamag, *Madani SAN 81187*, 14 Jun 1975 (SAN); Tawau, Bombalai, *Meijer SAN 41028*, 1 Dec 1963 (SAN).

6. *Dendrophthoe constricta* (Korth.) Danser (Fig. 5)

This variable species has acuminate anthers and a red-brown indumentum with leaves that measure 10–25 cm in length. The corolla is usually < 30 mm in length. This species is a fairly common one and may be found on *Sambucus*, *Melastoma* and *Ficus*. The leaves have fairly strongly arcuate veins that are raised on the undersurface. Interesting specimens have been collected from Pig Hill (*RSNB 4509*, *T.J. Barkman 119*) that have small leaves that are outside of the reported range of this species. While it is not uncommon to find reduced leaf size on species that occur on extreme ultramafic sites on Mount Kinabalu, it is not clear why a parasitic plant should exhibit such features. The *Cannon & Harting* and *Jusimin Duaneh* specimens cited below are also interesting in that the flowers are 4-merous. Both were collected from Kg. Kiau. While *D. quadrifida* is the only 4-merous species known from Mount Kinabalu, the specimen studied here had acuminate anthers and otherwise match the description of *D. constricta* well. Flower buds are yellow below with a greenish collar and red tip above.

Elevational range: 100–2300 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Ranau, Kepangian, *Gambating SAN 106762*, 14 Feb 1986 (SAN); Keningau, Delayan, *Nordin SAN 84222*, 22 Jan 1977 (SAN); Keningau, Ulu Sungai Bersanon, *Fidilis SAN 128595*, 7 Aug 1990 (SAN); Keningau, Kampung Tiulan, *Nordin SAN 84285*, 16 Feb 1977 (SAN); Keningau, Ulu Sungai, *Asik SAN 128174*, 9 Aug 1990 (SAN); Ranau, Kampong Gona Gona, *Gambating SAN 116296*, 25 Sep 1986 (SAN); Tambunan, Kaingaran, *Bousi, J. SAN 113557*, 26 May 1986 (SAN); Ranau, Lohan, *Aban SAN 56677*, 6 Apr 1967 (SAN); Ranau, Mamut, *Gambating SAN 116339*, 9 Oct 1986 (SAN); Ranau, Marakau, *Gambating SAN 114304*, 22 Apr 1986 (SAN); Ranau, Lohan, *Gambating SAN 105626*, 24 Mar 1986 (SAN); Tenom, Ulu Sungai Tomani, *Madani SAN 90841*, 13 Jun 1979 (SAN); Keningau, Tulid, *Nordin SAN 84317*, 14 Mar 1977 (SAN); Ranau, Tenompok FR, *Mikil SAN 38742*, 1 Oct 1963 (SAN); Tenom, Melalap, *Asik SAN 96313*, 16 Apr 1985 (SAN); Lahad Datu, Silam FR, *Madani SAN 133918*, 14 Apr 1992 (SAN); Tambunan, Trus Madi, *Sugau JBS 147*, 9 Mar 1995 (SAN); Kinabatangan, Maliau

Basin, *Hendry MB89*, 9 Apr 2000 (SAN); Lahad Datu, Silam, *Talip SAN 52851*, 24 Sep 1965 (SAN); Ranau, Pig Hill, *Chew RSNB 4509*, 24 Feb 1964 (SAN); Koko plantation, Tawau Park Hill, 250 m, *Rimi Repin, Kinahim & Gusili SNP 16048*, 15 Mar 2001 (SNP); Bukit Bombalai, outside Taman Bukit Tawau, *Dolois & Hendry SNP 12518*, 13 Jan 2006 (SNP); Twin Bed cabin, PHQ, 1600 m, *T.J Barkman KNP 15587*, 22 Sep 2000 (SNP); Kinabalu Park, Pig Hill, 2,200 m, *Alim Biun & Reed Beaman KNP 05859*, 17 Feb 1994 (SNP); Kota Belud, Kinabalu National Park, *Chew RSNB 2511*, 28 Jul 1961 (SAN); Pig Hill, 2,300 m, *Barkman T.J. Barkman 119*, 25 Feb 1995 (SNP); 600 ft, on Ficus, *Sato UKM-Sato 4*, 18 Jun 1981 (UKMB); Kg. Kiau, coffee plantation, 1400 m, *Cannon & Harting C. H. Cannon & J. R. Harting 97.524*, 21 Dec 1997 (SNP); Kg. Kiau Nuluh, *Duaneh PEK-J. Duaneh 38*, 16 Sep 1992 (SNP); Kg. Nalumad, 5 batu dari kg. Kawasan Taman, *Andau PEK-D. Andau 895*, 25 Oct 1996 (SNP).

7. *Dendrophthoe curvata* (Blume) Miq.

All Sabah collections match descriptions of this species in that the anthers are blunt and the corolla tube is more-or-less curved; however, the corolla only measures c. 20–28 mm which is less than the lower limit (30 mm) described for the species (Barlow 1997). Barlow (1997) suggested that there could be hybrids between *D. curvata* and *D. pentandra*, particularly in Borneo, and our observations of the specimens cited below are consistent with that hypothesis. This polymorphic species requires study and molecular data may provide clarity with regard to the putative hybrid nature of Sabah material. Most of the material placed here was collected from particularly low elevations.

Elevational range: 20–100 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Sipitang, Marintaman, *Amin SAN 86508*, 14 Jul 1985 (SAN); Beaufort, Siaungau FR, *Amin SAN 105997*, 24 Jul 1991 (SAN); Papar, Mandahan, *Amin SAN 114659*, 8 Jul 1987 (SAN); Beaufort, Binsulok, *Amin SAN 127397*, 28 Nov 1992 (SAN); Papar, Mandahan, *Marsal SAN 86194*, 11 Feb 1981 (SAN); Beaufort, Pimping, *Amin SAN 115336*, 18 Jan 1990 (SAN); Sipitang, Marintaman, *Amin SAN 86473*, 11 Jul 1985 (SAN); Beaufort, Siaungau FR, *Amin SAN 127096*, 25 Nov 1990 (SAN); Siaungau FR, Beaufort, *Talib SAN 80612*, 24 Jun 1976 (SAN); Kota Kinabalu, Pulau Gaya National Park, *Kanis SAN 56118*, 16 Feb 1966 (SAN); Ranau, Poring, *Gambating SAN 129347*, 20 Oct 1988 (SAN); Ranau, Kilimu, *Gambating SAN 120446*, 23 Oct 1987 (SAN); Ranau, Pig Hill, *Chew RSNB 4497*, 24 Feb 1964 (SAN); Marintaman Mengalong National Park, Sipitang, *Argent G. Argent 1555*, 24 Mar 1980 (SAN); Sipitang, 40 m, Kerangas area, *Beaman J.H. Beaman 8423*, 2 Feb 1984 (UKMB); Menggatal, Teluk Karambunai, 30 m, *Akin S. Akin 2376*,10 Jan 1992 (UKMB); Melangkap Tomis, 100 m dari Belai raya, *Lugas PEK-L. Lugas 840*, 14 Aug 1995 (SNP); Melangkap Tomis, 3 km dari Kg., *Lugas PEK-L. Lugas 2474*, 9 Jul 1996 (SNP); Melangkap Tomis, 10 rantai dari Kg., *Lugas PEK-L. Lugas 406*, 26 May 1995 (SNP).

8. *Dendrophthoe lanosa* (Korth.) Danser

In this species, the anthers are acuminate, the bracts are foliaceous and longer than the ovary with a dense indumentum and the flowers are sessile. *Dendrophthoe lanosa* is cited in Beaman et al. (2001) as occurring on Kinabalu based on a single collection from Tenompok.

Elevational range: around 1500 m (from Beaman et al. 2001).

SPECIMEN EXAMINED: none.

9. *Dendrophthoe locellata* Danser

This species has flowers usually borne on galls and the petioles are more or less thickly winged. In Sabah, specimens have corollas that are shorter (25–28 mm) than that reported by Barlow (1997) for this species and in some material the leaves are less than 3 cm wide and at the lower limit listed for length (6–7 cm) in Barlow (1997). The anthers vary in length from 2.5 mm to 4 mm, which is also shorter than that described for *D. locellata*. Many salt deposits are evident upon leaves of our specimens.

Elevational range: 0–30 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Kudat, Balambangan Island, *Sugau JBS 39*, 19 Oct 1994 (SAN); Kota Kinabalu, Pulau Gaya National Park, *Mikil SAN 46595*,13 Sep 1964 (SAN); Kudat, Balambangan FR, *Stone SAN 87090*, 7 Apr 1977 (SAN); Kudat, XPDC Balambangan Is., *Dolois & Masius SNP 18420*, 21 May 2003 (SNP); Kudat, XPDC Balambangan Is., *Dolois & Masius SNP 18704*, 26 May 2003 (SNP); Taman Tunku Abdul Rahman, Pulau Sapi, *Rimi, Dolois, Reed, Ansow & Sinail SNP 07266*, 22 Mar 1995 (SNP).

10. *Dendrophthoe longituba* (Elmer) Danser (Fig. 6)

The bright yellow, long (55–90 mm) flowers make this a distinctive species, which can form very long sprawling stems in the canopies of montane forest trees. It has acuminate anthers and the bracts are longer than the ovary. The corollas are yellow throughout.

Elevational range: 1300–1800 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Nabawan, *Fidilis SAN 119351*, 23 May 1987 (SAN); Keningau, Sg. Pingas Pingas, *Fidilis SAN 115825*, 23 May 1986 (SAN); Kinabatangan, Maliau Basin, *MB46*8, 12 Aug 2000? (SAN); Kota Belud, Kinabalu National Park, *Kanis SAN 50117*, 22 Sep 1965 (SAN); Ranau, Kinasaraban, *Aban SAN 60749*, 28 Sep 1967 (SAN); Kota Belud, Mount Kinabalu, *Chew* RSNB 3001, 13 Sep 1961 (SAN); Penampang, Longkogunan, *Pereira JTP 507*, 15 Sep 1997 (SAN); PHQ, near generator,

1500 m, *Gusili, Bella & Barkman SNP 14898*, 22 Sep 2000 (SNP); Ranau, Sosopodon, *Mikil SAN 38655*, 13 Jul 1963 (SAN); Beaufort, *Nicholson SAN 41128*, 20 Jan 1964 (SAN); Lahad Datu, Bukit Silam, *Mujin SAN 37854*, 21 Jun 1963 (SAN).

11. *Dendrophthoe pentandra* (L.) Miq. (Fig. 7)

This species has the shortest flowers of the genus in Sabah. It is one of the species with blunt anthers and is reliably identified by its inflated corolla that is split 1/2 to base with white or grey tomentum produced over the corollas. The corollas are usually yellow-green in bud and then develop a uniform salmon to orange-red colour at anthesis.

Elevational range: 500–1100 m.

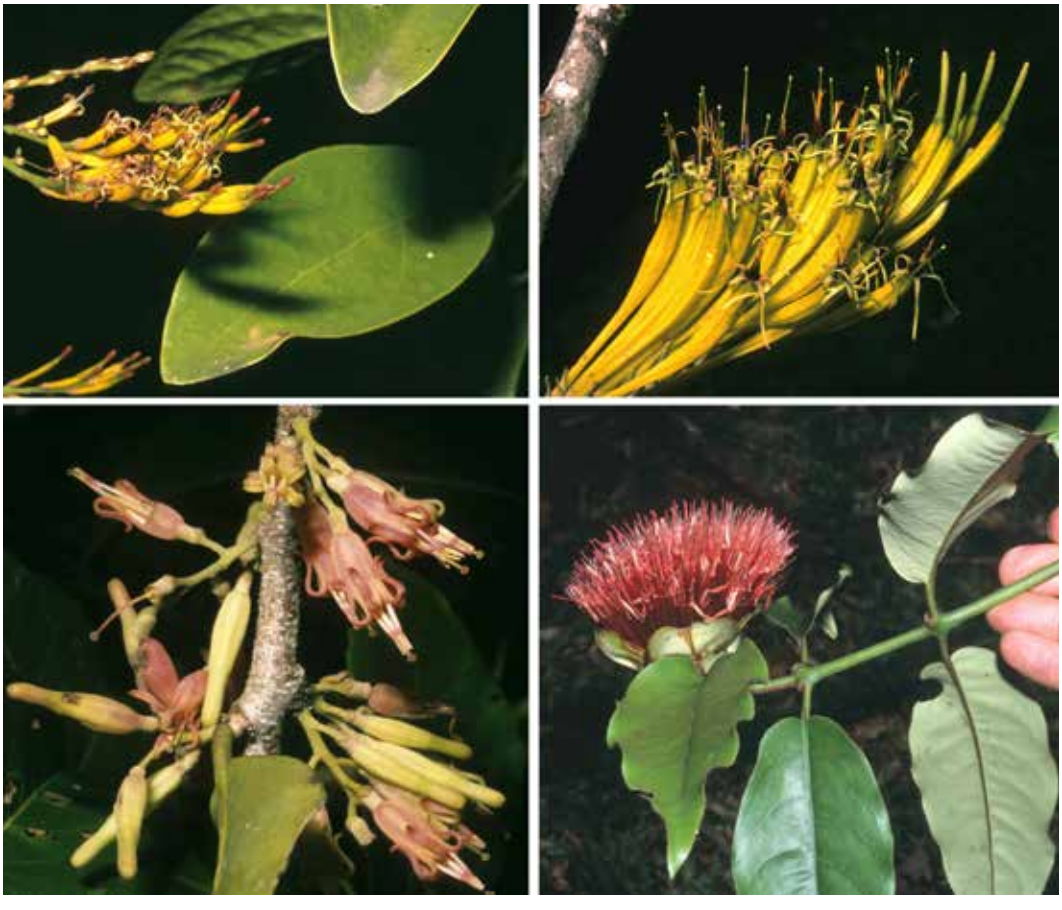
SPECIMENS EXAMINED—BORNEO. SABAH: Ranau, Kampong Takutan, *Shea SAN 77137*, 23 May 1973 (SAN); Beluran, Bonggaya FR, *Aban SAN 81972*, 16 Jul 1975 (SAN); Ranau, Tudangan, *Gambating SAN 115985*, 18 Jul 1986 (SAN); Beluran, Labuk Sugut, Sungai Ruku Ruku, *Rahim* SAN 94998, 22 Jun 1982 (SAN); 3 miles upriver from Long Pasia, 1000 m, Meganit, *Hoare* et al. *A. Hoare et al.128*, 10 Apr 2000 (SNP); Rangkam, Bundu Tuhan, 1100 m, *T.J Barkman SNP 15593*, 11 Sep 2000 (SNP); Ranau, Kamburongoh, *Meijer SAN 29142*, 7 Feb 1962 (SAN); Kota Belud, Mt. Kinabalu, *Aban SAN 76512*, 11 Feb 1973 (SAN); In front of staff quarters, Taman Bukit Tawau, *Rimi, Rahimah & Gusili SNP 09782*, 25 Aug 1999 (SNP); Beluran, Labuk Sugut, Sungai Ruku Ruku, *Aban SAN 60111*, 4 Jun 1984 (SAN); Sandakan, Leila FR, *Lee SAN 96270*, 22 Jul 1983 (SAN); Sipitang, Gunong Lumaku, *Diwol SAN 77862*, 21 Aug 1973 (SAN); Near Saat, Bundu Tuhan, 1400 m, *Barkman* T. Barkman 300, 4 Dec 1997 (SNP); Tambunan, Kitau, *Gambating SAN 95457*, 8 Sep 1982 (SAN); Beaufort, Klias FR, *Talib SAN 80718*, 26 Jul 1976 (SAN); Beluran, Telupid, *Diwol SAN 71482*, 5 Feb 1971 (SAN).

12. *Dendrophthoe quadrifida* Danser

This species is cited by Beaman et al. (2001) as occurring on Mount Kinabalu based on the type collection and one other by the Clemenses, both from Marai Parai. It is presumably very localized to Marai Parai, however, abundant collections made at that locality over the last 20 years by SNP has not resulted in its rediscovery. *Dendrophthoe quadrifida* has 4-merous flowers with blunt anthers making it distinctive from any other in the state. The only 4-merous collections we observed were those of *D. constricta* from Kiau but those specimens have acuminate anther appendages.

Elevation: 1200–1500 m (from Beaman et al. 2001).

SPECIMEN EXAMINED: none.



(Above left and right) **Fig. 5.** *Dendrophthoe constricta* collected at the Kinabalu Park Headquarters. **Fig. 6.** *Dendrophthoe longituba* is conspicuous due to its long yellow flowers and may be found at the Kinabalu Park Headquarters. (Below left and right) **Fig. 7.** *Dendrophthoe pentandra* is shown here with younger yellow-green flower buds and salmon-coloured flowers at anthesis. **Fig. 8.** *Lepeostegeres centiflorus* is commonly found in Sabah and conspicuous due to the production of a head of numerous red flowers.

***Dendrophthoe* indet.**

Sandakan, Leila FR, *Sam SAN 26397*, 20 Jul 1961 (SAN); Papar, Mandahan, *Sinanggul SAN 47856*, 24 Oct 1964 (SAN); Kinabatangan, Sukau, *Gambating SAN 68037*, 27 Feb 1985 (SAN); Sipitang, Usok, *Aban SAN 67117*, Jan 1971 (SAN); Ranau, Pinosok, *Gambating SAN 123478*, 19 Sep 1988 (SAN); Keningau, Sook, *Sadau SAN 49527*, 25 Apr 1965 (SAN); Sipitang, Marintaman, *Amin SAN 86473*, 11 Jul 1985 (SAN); Kota Belud, Kampong Lebong Lebong, *Maikin SAN 108967*, Aug 1985 (SAN); Beluran, Labuk Sugut, Sungai Tahid,

Gambating SAN 67362, 22 Jan 1985 (SAN); Ranau, *Mikil SAN 37719*, 28 Sep 1963 (SAN); Papar, Kimanis, *Pereira JTP 520*, 18 Sep 1997 (SAN); Kinabatangan, Lamag, *Burgess SAN 40426*, Aug 1961 (SAN); Ranau, Pig Hill, *Chew RSNB 4497*, 24 Feb 1964 (SAN); Sipitang, Bukit Sebuboh, 120 m, *Beaman J.H. Beaman 8728*, 1 Mar 1984 (UKMB); Tambunan, Trus Madi FR, *Mikil SAN 41836*, 11 Nov 1964 (SAN).

Elytranthe

13. *Elytranthe albida* (Blume) Blume

This is a new record for Mount Kinabalu. The woody bracts in fruit are distinctive and the flowers are very long (c. 50 mm). The corollas are reddish below and green at the tip.

Elevational range: 1400–1800 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Ranau, Sosopodon, *Lajangah SAN 33132*, 25 Nov 1962 (SAN); Ranau, Sosopodon, *Meijer SAN 28590*, 20 Feb 1962 (SAN); Ranau, Sosopodon FR, *Aban SAN 62224*, 28 Oct 1967 (SAN); Kota Belud, Kinabalu National Park, *Adam SAN 56364*, Nov 1966 (SAN); Kota Belud, Kinabalu National Park, *Meijer SAN 57526*, 29 Nov 1966 (SAN); Kinabatangan, Gunong Rara FR, *Fidilis SAN 94717*, 30 Mar 1982 (SAN); Tambunan, Crocker Range (National Park), *Chow SAN 65046*, 13 Oct 1969 (SAN); Sipitang, Long Pa Sia, ? *MTED 383*, 27 Jun 1997 (SAN); Ranau, Sosopodon FR, *Meijer SAN 42788*, 17 Feb 1965 (SAN); Sipitang, Melingan FR, *Madani SAN 132719*, 13 Jul 1991 (SAN); Ranau, Kinabalu Park, PHQ, *Gusili SNP 18234*, 13 Jan 2004 (SNP).

Helixanthera

14. *Helixanthera coccinea* (Jack) Danser

In Sabah, this species is distinguished from others by its short, 4-merous corollas (<13 mm long) that are produced on short inflorescences (< 70 mm long). Most material have been collected from low elevations.

Elevational range: 150–200 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Sipitang, SFI, *Amin SAN 86515*, 15 Jul 1985 (SAN); Lahad Datu, Orchid Plateau, *Kumin SAN 71094*, 25 Jul 1970 (SAN); Kinabatangan, Pinangah FR, *Sumbing SAN 110191*, 17 Sep 1985 (SAN); Ranau, Mesilau Trail, *Chow SAN 76404*, 26 Sep 1972 (SAN); Beluran, Labuk Sugut, Sungai Kibiribi, *Aban SAN 99313*, 18 Jul 1983 (SAN); Keningau, Sungai Milian, *Sumbing SAN 118641*, 13 Nov 1986 (SAN); Sandakan, *Singh SAN 58760*, 27 Oct 1966 (SAN); Sandakan, *Diwol SAN*

74976, 14 Dec 1971 (SAN); Tawau, Kinabutan Kechil, *Aban SAN 35884*, 21 May 1963 (SAN); Kota Belud, *Lorence PEK-L.Lugas 1967*, 18 April 1996 (SAN).

15. *Helixanthera crassipetala* (King) Danser

This is one of two species in Sabah with long corollas (>15 mm long). The other species with long corollas is *H. cylindrica* but material of it has pedicels that are longer than the ovary produced on a longer inflorescence axis. *Helixanthera crassipetala* specimens have flowers that are essentially lacking a pedicel and produce thick leaves that are coriaceous with indistinct venation, thus appearing finely striate.

Elevational range: none listed.

SPECIMENS EXAMINED—BORNEO. SABAH: Tambunan, Gunong Alab, *Sumbing SAN 121692*, 13 Aug 1987 (SAN); Tambunan, Gunung Trus Madi, *Sumbing SAN 125500*, 16 Aug 1988 (SAN).

16. *Helixanthera cylindrica* (Jack) Danser

This species is similar to *H. crassipetala* but the inflorescence length difference allows for discrimination of most material. Barlow (1997) suggests that the two species may hybridize so some material may be difficult to identify. However, the material we have separated is quite distinct. This species is known primarily from the Keningau-Tenom-Papar region of western Sabah.

Elevational range: around 1000 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Nabawan, Bkt. Pisagan, *Sumbing SAN 127617*, 17 Jun 1989 (SAN); Keningau, Ulu Sungai Bersanon, *Fidilis SAN 128163*, 8 Aug 1990 (SAN); Tenom, Melalap, *Sumbing SAN 139220*, 8 Jul 1995 (SAN); Keningau, Ulu Sungai Bersanon, *Fidilis SAN 128598*, 7 Aug 1990 (SAN); Keningau, Bunang, *Nordin SAN 85801*, 22 Jul 1977 (SAN); Kinabatangan, Gunong Lotung, *Cockburn SAN 83131*, 15 May 1976 (SAN); Kuala Penyu, Mansud, *Amin SAN 103012*, 19 Feb 1986 (SAN); Papar, Mandahan, *Amin SAN 103135*, 18 Apr 1986 (SAN); Keningau, Sook, *Meijer SAN 50160*, Jul 1965 (SAN).

17. *Helixanthera maxwelliana* (Gibbs) Danser

Material of this species typically has short, 5-merous corollas (<13 mm long), with the style reaching the top of the anthers and a short inflorescence axis (c. 70 mm). Sabah material often have leaves that are broader than Barlow's description and ovary length may be longer than 3–4 mm. The flowers and inflorescence axis are red.

Elevational range: 100–1700 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Ranau, Sosopodon, *Mikil SAN 56291*, 23 Mar 1966 (SAN); Ranau, Sosopodon FR, *Aban SAN 56717*, 26 Apr 1968 (SAN); Ranau, Sosopodon, *Mujin SAN 33796*, 20 Apr 1963 (SAN); Tuaran, Pahu, *Soinin SAN 101937*, 16 Oct 1989 (SAN); Lahad Datu, Silabukan FR, *Pereira SAN 29770*, 9 May 1962 (SAN); Kota Belud, Kinabalu National Park, *Lajangah SAN 36152*, 15 Jul 1963 (SAN); Tambunan, *Soinin SAN 124974*, 21 Oct 1989 (SAN); Ranau, Poring, *Lampangi SAN 24079*, 17 Feb 1961 (SAN); Tawau, *Fidilis SAN 89768*, 19 Mar 1979 (SAN); Kinabatangan, Gunong Rara FR, *Fidilis SAN 94715*, 29 Mar 1982 (SAN); Beluran, Sg. Ensuan, *Aban SAN 91646*, 17 Apr 1980 (SAN); Kinabatangan, Lamag, *Lassan SAN 70662*, 13 May 1970 (SAN); Kinabatangan, Tenegang Besar, *Singh SAN 51857*, 25 May 1965 (SAN); Kinabatangan, Tongod, *Diwol SAN 90311*, 14 Jun 1982 (SAN); Ranau, Sosopodon, *Mikil SAN 46506*, 29 Jul 1964 (SAN); Lahad Datu, Ulu Sungai Danum, *Cockburn SAN 85089*, 26 Aug 1976 (SAN); Kinabatangan, Sungai Tenegang Besar, *Majawat SAN 120955*, 25 Jul 1987 (SAN); Beluran, Labuk Sugut, Telupid, *Madani SAN 75379*, 28 Jul 1972 (SAN); Lahad Datu, Bukit Silam, *Talip SAN 52798*, 18 Sep 1965 (SAN); Mamut Copper Mine, *Beaman J.H. Beaman 10357*, 28 Jun 1984 (UKMB).

18. *Helixanthera parasitica* Lour.

This species has a rather wide elevational range and is recorded as parasitic on *Quercus* and species of Rutaceae in Sabah.

Elevational range: 20–1600 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Ranau, Nalapak, *Gambating SAN 117397*, 9 Mar 1987 (SAN); Sandakan, Sibuga, *Bakar SAN 27711*, 3 Oct 1961 (SAN); Ranau, Mamut, *Gambating SAN 129376*, 19 Nov 1988 (SAN); Sandakan, Sibuga, *Singh SAN 27472*, 19 Oct 1961 (SAN); Ranau, Sungai Mesilau, *Chew RSNB 4318*, 10 Feb 1964 (SAN); Ranau, Sungai Kenipir, *Gambating SAN 106755*, 7 Feb 1986 (SAN); Ranau, Badukan, *Gambating SAN 117949*, 17 Jun 1987 (SAN); Papar, *Jawanting SAN 41379*; 25 Jan 1964 (SAN); Tambunan, Trus Madi FR, *Meijer SAN 122652*, 14 Nov 1987 (SAN); Tambunan-Ranau Rd., 1100 m, *Joseph JWT 07*, 5 Mar 1995 (SAN); Keningau, Sook, *Sadau SAN 49576*, 27 May 1965 (SAN); Sipitang, Mengalong FR, *Talip SAN 50616*, 22 Nov 1966 (SAN); Sipitang, Long Pa Sia, ? *MTED 229*, 23 Jun 1997 (SAN); Beluran, Labuk Sugut, Segaliud Lokan FR, *Gambating SAN 68198*, 20 Nov 1984 (SAN).

19. *Helixanthera pulchra* (DC.) Danser

This is a new record for Borneo. Its discovery in Sabah is not surprising given its widespread distribution in Thailand, Sumatra and Peninsular Malaysia (Barlow 1997). *Helixanthera apodanthes* is a synonym of *H. puchra* (Barlow 1997) and specimens in Sabah may be

annotated as such. The species is only known from forests in the Keningau-Tenom area at low elevations. Whether suitable forest still exists in the areas it has been collected from is unknown since the last specimens were collected in 1995.

Elevational range: 200–550 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Nabawan, Bkt. Pisagan, *Fidilis SAN 139619*, 21 Feb 1995 (SAN); Keningau, Sungai Mantuluk, *Fidilis SAN 113297*, 20 Jan 1986 (SAN); Tenom, *Sumbing SAN 120116*, 13 Mar 1987 (SAN); Keningau, Sook, *Collenette J.S. Collenette 32/79*, Sep 1979 (SAN); Keningau, Pensiangan Kayu FR, *Asik SAN 136866*, 20 Jan 1994 (SAN); Tenom, Mandalom FR, *Fidilis SAN 136135*, 16 Aug 1993 (SAN); Keningau, Pensiangan Kayu FR, *Fidilis SAN 130065*, 7 Jul 1992 (SAN); Nabawan, Bkt. Pisagan, *Sumbing SAN 127619*, 17 Jun 1989 (SAN); Nabawan, Pensiangan, Penantaman, *Fidilis SAN 131455*, 9 Jul 1991 (SAN); Keningau, Bunang, *Nordin SAN 85814*, 23 Jul 1977 (SAN); Keningau, Tulid, *Talib SAN 80379*, 21 Feb 1976 (SAN); Keningau, Sook, *Madani SAN 87160*, 11 Aug 1977 (SAN); Keningau, Ulu Sungai Tinagalan, *Sumbing SAN 113093*, 18 Nov 1985 (SAN); Sipitang, Gunong Lumaku, *Sadau SAN 49491*, 8 Apr 1965 (SAN); Tambunan, *Ignatius SAN 140153*, 2 May 1995 (SAN); Keningau, Witti Range, *Fidilis SAN 118542*, (30 Oct 1986SAN); Keningau, Tulid, *Saikeh SAN 73291*, 21 May 1971 (SAN); Keningau, Tulid, *Diwol SAN 77529*, 13 Apr 1973 (SAN); Tenom, Tomani, *Majawat SAN 130788*, 15 Aug 1990 (SAN); Keningau, Kampung Binakaan, *Nordin SAN 85614*, 14 Apr 1977 (SAN).

20. *Helixanthera spicata* Danser

This species is cited by Beaman et al. (2001) as occurring on Mt. Kinabalu from two collections by the Clemenses, both from Penigupan. Therefore, it would seem very localized in its distribution there.

Elevational range: 1200–1500 m (from Beaman et al. 2001).

SPECIMENS EXAMINED: none.

Lampas

21. *Lampas elmeri* Danser

This monotypic genus appears to be endemic to Sabah and is recognized by its whorled leaves (3 or 4 per node) and a deflexed inflorescence that has upward-pointing flowers in a dense cluster at the apex. The flowers are brilliant orange-red with yellow, reflexed corolla lobes and acuminate anthers that are exserted well beyond the corolla lobes. Herbarium specimens of *Lampas elmeri* have leaves with a dark brown margin and midrib on the undersurface of the leaves due to the production of minute scales as in *Lepeostegeres bahajensis* and *L.*

lancifolius. In addition, the leaves of *Lampas* are distinctly whitened beneath as compared to the upper green surfaces, at least when fresh. It was recorded as parasitic on Dilleniaceae, *Mallotus* and *Meliosma*.

Elevational range: 50–500 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Beluran, Labuk Sugut, Maliau, *Sigin SAN 99717*, 26 Jul 1983 (SAN); Lahad Datu, Bukit Silam, *Majawat SAN 138305*, 23 Oct 1993 (SAN); Lahad Datu, Ulu Segama, *Cockburn SAN 84915*, 17 Aug 1976 (SAN); Lahad Datu, Ulu Sungai Danum, *Cockburn SAN 85069*, 26 Aug 1976 (SAN); Kinabatangan, Pinangah, *Mansus SAN 109218*, 28 May 1985 (SAN); Kinabatangan,Ulu Sungai Pingas Pingas, *Asik SAN 110879*, 11 Mar 1985 (SAN); Lahad Datu, Danum Valley, *Campbell SAN 112301*, 21 Oct 1985 (SAN); Tawau, Tawau Hill Park, *Binson SAN 62929*, 18 Apr 1968 (SAN); Tawau, Tawau Hill Park, *Binson SAN 63915*, 5 Oct 1968 (SAN); Tawau, Bukit Tukok, *Bakar SAN 24954*, 3 May 1961 (SAN); Sandakan, Sungai Kapur, *Singh SAN 22876*, 17 Oct 1960 (SAN); Lahad Datu, Tabin FR, *Sugau JBS 321*, 7 Mar 1998 (SAN); Imbak Canyon, 550m, path from eight-tier waterfall up to ridge, *Gregson Gregson 21*, 13 May 2004 (SAN); Kinabatangan, Gunong Rara FR, *Shea SAN 75621*, 21 Apr 1972 (SAN); Kinabatangan, Gunong Rara FR, *Chow SAN 75658*, 14 Apr 1972 (SAN); Beluran, Labuk Sugut, Telupid, *Zainudin A.Zainuddin 4945*, 8 Apr 1994 (SAN); Kinabatangan, Sukau, *Lim LSP 1187*, 16 Sep 1996 (SAN); Kinabatangan, Pinangah, *Wong WKM 2347*, 2 Sep 1992 (SAN); Kinabatangan, Bukit Tinkar, *Wong WKM 2209*, 24 Aug 1992 (SAN); Beluran, Labuk Sugut, Bidu Bidu FR, *Kulip SAN 131040*, 22 Feb 1991 (SAN); Beluran, Labuk Sugut, Maliau, *Sigin SAN 99717*, 26 Jul 1983 (SAN); Kinabatangan, Lamag FR, *Diwol SAN 142956*, 26 Apr 2001 (SAN); Kinabatangan, Sukau, *Reza RA 274*, 29 Mar 1995 (SAN); *Lassan SAN 70743*, 10 May 1970 (SAN); Lahad Datu, Danum Valley, *Campbell SAN 110727*, 16 Jan 1987 (SAN); Kinabatangan, Sungai Menanggol, *Gambating SAN 69948*, 20 Feb 1985 (SAN); Beluran, Labuk Sugut, Lung Manis, *Fox SAN 58854*, 25 Jan 1967 (SAN); Kinabatangan, Tongod, *Diwol SAN 97305*, 10 Jun 1983 (SAN); Keningau, Sungai Maadun, *Fidilis SAN 118801*, 20 May 1987 (SAN); Tawau, Kalabakan, *Fidilis SAN 95805*, 21 Jun 1982 (SAN); Keningau, Nabawan/Pandewan, *Fidilis SAN 128582*, 29 Mar 1990 (SAN); Tawau, Luasong, *Fidilis SAN 82242*, 17 Mar 1977 (SAN); Kinabatangan, Dagat, *Majawat SAN 120668*, 20 Jul 1987 (SAN); Sandakan, Gomantong, *Bousi SAN 122774*, 21 Jan 1988 (SAN); Keningau, Witti Range, *Sumbing SAN 110168*, 22 Aug 1985 (SAN); Lahad Datu, Silam, *Talip SAN 68400*, 22 May 1970 (SAN); Kinabatangan, Tangkulap FR, *Diwol SAN 124669*, 26 May 1988 (SAN); Beluran, Labuk Sugut, Telupid, *Diwol SAN 79484*, 20 May 1978 (SAN); Lahad Datu, Takon, *Agam SAN 41633*, 20 Apr 1964 (SAN); Kinabatangan, Sungai Namatoi, *Madani SAN 88847*, 12 Jun 1978 (SAN); Lahad Datu, Danum Valley, *Campbell E.J.F. Campbell-Gasis 249*, 20 Feb 1992 (SAN); Nabawan, Pensiangan, Labang, *Sumbing SAN 125226*, 14 Oct 1988 (SAN); Kinabatangan, Sungai Pin, *Hepburn SAN 43348*, 24 Feb 1966 (SAN); Tawau, Balung hot springs area, Tawau Park Hill. 868 ft., *Dolois, Benedict, Jusimin, Johnny, & Jinulus SNP 17450*, 26 Sep 2002 (SNP); Telupid, XPDC Ulu Tongod, route to Mt. Moliou, *Dolois, Yabinus, Sinal& Gusili SNP 09859*, 19 Aug 2004 (SNP).

Lepeostegeres

22. *Lepeostegeres bahajensis* (Korth.) Miq.

This distinctive species has acute to acuminate leaves with an inflorescence of 9–12 flowers, each of which has corolla lobes reflexed at the 1/2 point of the tube. Perhaps most distinctive are the darkened stems and petioles due to the dense layer of scurfy black scales.

Elevational range: around 25 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Penampang, Babagon, *Diwol SAN 77513*, 24 Mar 1973 (SAN); Papar, Kimanis, *Meijer SAN 36281*, 5 May 1963 (SAN); Papar, Mandahan, *Talib SAN 80654*, 19 Jul 1976 (SAN); Papar, Kimanis, *Udarbe SAN 28166*, 5 Sep 1962 (SAN); Sipitang, Mengalong FR, *Madani SAN 111409*, 14 Sep 1985 (SAN); Sipitang, Kuala Mengalong, *Amin SAN 132105* 24 May 1993 (SAN).

23. *Lepeostegeres becarrii* (King) Gamble

This species is distinctive due to its very long involucre (>50 mm) and corolla (> 80 mm). An interesting specimen was collected between Crocker Range Headquarters and Ulu Kimanis (*SJD 99203*) that fits well with the description of this species except that it has twice the number of flowers reported for this species (c. 50). It was recorded as parasitic on *Mallotus*.

Elevational range: 600–1000 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Sandakan, Sibuga, *Nicholson SAN 48560*, 19 Feb 1965 (SAN); Keningau, Apin Apin, *Gambating SAN 95492*, 14 Sep 1982 (SAN); Lahad Datu, Mostyn, *Talip SAN 68336*, 16 May 1970 (SAN); Ranau, Bkt. Mentapok, *Gambating SAN 97251*, 14 Apr 1983 (SAN); Kota Marudu, Marak Parak, *Aban SAN 100018*, 18 Aug 1983 (SAN); Sipitang, Long Pa Sia, *Lamb MTED 482*, 30 Jun 1997 (SAN); Ranau, Randagong, *Gambating SAN 121430*, 11 Nov 1987 (SAN); Lahad Datu, Danum Valley Road, *George SAN 138404*, 27 Oct 1993 (SAN); Kota Belud, Mount Kinabalu, *Chew RSNB 527*, 8 Jun 1961 (SAN); Road from Crocker Range Headquarters to Ulu Kimanis, 1000m, *S. Davies SJD 99203*, 19 Oct 1999 (SNP).

24. *Lepeostegeres centiflorus* (Stapf) Tiegh. (Fig. 8)

This species is widespread in Sabah and highly variable in the number of red flowers produced per inflorescence (a range of 30–110 flowers was observed) as well as in terms of length of the flowers. In spite of the variation, it is reliably recognized as distinctive from other Sabah species by its spreading bracts in an inflorescence with numerous flowers. Only in one specimen did we ever observe less than 30 flowers (*SNP13326*). The post-anthesis spreading bracts also serve to separate this species from others. Extensive study may reveal the presence of distinct varieties.

Elevational range: 20–1600 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Ranau, Sosopodon, *Mikil SAN 37728*, 29 Sep 1963 (SAN); Kota Belud, Mount Kinabalu, *Chew RSNB 2510*, 28 Aug 1961 (SAN); Tenom, *Sumbing SAN 120192*, 19 Mar 1987 (SAN); Ranau, Bambangan, *Gambating SAN 118101*, 17 Jun 1987 (SAN); Ranau, Salang, *Gambating SAN 121047*, 29 Sep 1987 (SAN); Sipitang, Sungai Melobid, *Lim SAN 143487*, 17 Apr 2000 (SAN); Ranau, Tudangan, *Aban SAN 60718*, 15 Sep 1967 (SAN); Ranau, Kampong Takutan, *Shea SAN 77143*, 23 May 1973 (SAN); Ranau, Badukan, *Gambating SAN 116073*, 22 Jul 1986 (SAN); Beluran, Labuk Sugut, Bukit Meliau, *Zainudin A.Zainudin 4817*, 4 Apr 1994 (SAN); Beaufort, Binsulok FR, *Amin SAN 102882*, 23 Feb 1987 (SAN); Tambunan, Kampong Mansorulong, *Nordin SAN 85920*, 10 Jul 1978 (SAN); Ranau, Badukan, *Gambating SAN 118275*, 24 Jul 1987 (SAN); Ranau, Minisalu, *Gambating SAN 116224*, 20 Sep 1986 (SAN); Kota Kinabalu, Telipok, *Meijer SAN 136194*, 29 Jun 1992 (SAN); Sipitang, Long Pa Sia, *Lamb MTED 377*, 27 Jun 1997 (SAN); Ranau, Bukit Taviu, *Aban SAN 79348*, 11 Mar 1974 (SAN); Ranau, *Gambating SAN 118141*, 22 Jun 1987 (SAN); Papar, Mandahan, *Amin SAN 132248*, 21 Apr 1992 (SAN); Ranau, Tegudon, *Sadau SAN 49220*, 6 Aug 1965 (SAN); Ranau, *Soinin SAN 129149*, 27 Jul 1989 (SAN); Ranau, Bambangan, *Gambating SAN 121178*, Nov 1987 (SAN); Ranau, Bundu Tuhan, *Aban SAN 57503*, 27 Nov 1966 (SAN); Ranau, Bundu Tuhan, *Aban SAN 56357*, 22 Oct 1966 (SAN); Ranau, Kinabalu Park PHQ, 1,600 m, *T.J Barkman KNP 19067*, 4 Jul 2004 (SNP); Kinabalu Park, Pandanus trail, 1600 m, *Gusili, Ramli & Hasbollah SNP 17204*, 19 Jul 2002 (SNP); Kinabalu Park, Sayap substation, Kementis trail, 956 m, *Dolois SNP 19360*, 13 Jul 2004 (SNP); Tawau, Tawau Hill Park, 200 m from hot springs, *Dolois, Hendry & Yabainus KNP 13326*, 14 Dec 2006 (SNP); Kg. Togop Laut (Kg. Lampaki), *Dolois, Masius & Johny SNP 18300*, 25 Feb 2004 (SNP); XPDC Ulu Tongod, along Salonsong River, 620 m, *Dolois, Yabainus, Sinail & Gusili SNP 10096*, 17 Aug 2004 (SNP); Mt. Tambuyukon, Rt to Kopuakan camp, 850 m, *Jamili, Dolois, Duali Ahmad & Paul SNP 12203*, 29 Sep 2005 (SNP); Kopuakan River, Kinabalu Park, 500 m, *Jamili SNP 4528*, 13 Mar 91 (SNP); Kg. Kiau Teburi, roadside, *Dolois & Gusili SNP 06981*, 24 Nov 1994 (SNP); Kg. Kiau Nuluh, *Duaneh* 1 *PEK-J. Duaneh 37*, 8 Sep 1992 (SNP); Kg. Monggis, *Rumutom PEK-M. Rumutom 277*, 23 May 1996 (SNP); Kg. Takutan, *Tadong PEK-D. Tadong 270*, 10 Apr 19930 (SNP); Bukit Kulung near Bk. Hampuan, 600m, *Beaman, J.H. Beaman 8346*, 23.1.84 (UKMB); 400m dari rumah gunong doa, *Lugas PEK-L. Lugas 304*, 19 May 1995 (SNP); Danum Valley Jungle Lodge, 152m, *Z. Azuro 12*, 23 Aug 1992 (UKMB); Tawau, Luasong, *Fidilis SAN 82199*, 10 Mar 1977 (SAN); Beluran, Segaliud Lokan FR, *Madani SAN 81449*, 12 Mar 1975 (SAN); Sandakan, *Diwol SAN 74973*, 14 Dec 1971 (SAN); Lahad Datu, Ulu Segama FR, *Madani SAN 108588*, 11 Mar 1985 (SAN); Kinabatangan, Pin Supu FR, *Lideh SAN 117966*, 28 Jul 1986 (SAN); Kinabatangan, Sungai Namatoi, *Madani SAN 88827*, 11 Jun 1978 (SAN); Lahad Datu, Ulu Segama, *Argent SAN 108389*, 27 Feb 1985 (SAN); Kinabatangan, Bukit Garam, *Kambira SAN 117556*, 20 Feb 1987 (SAN); Sandakan, Gomantong, *Kamideh SAN 66577*, 16 Sep 1970 (SAN); Lahad Datu, Danum Valley, *Campbell E.J.F. Campbell-Gasis 253*, 20 Feb 1992 (SAN); Ranau, *Gambating SAN 116198*, 27 Aug 1986 (SAN); Beaufort,

Binsulok FR, *Amin SAN 132210*, 22 Feb 1992 (SAN); Nabawan, Pensiangan, Penantaman, *Fidilis SAN 128000*, 20 Sep 1989 (SAN); Ranau, *Gambating SAN 123584*, 28 Sep 1988 (SAN); Tawau, Kalabakan, *Fidilis SAN 95783*, 27 Jan 1983 (SAN); Tawau, Tawau Hill Park, *Aban SAN 79657*, 5 Jul 1974 (SAN); Tawau, Kalabakan, *Fidilis SAN 95993*, 6 Oct 1982 (SAN); Penampang, Tamparuliyan FR, *Amin SAN 103339*, 21 Jun 1987 (SAN); Ranau, Sosopodon, *Adam SAN 56368*, Nov 1966 (SAN); Ranau, Pinosok, *Gambating SAN 121619*, 22 Jul 1988 (SAN); Lahad Datu, Silam, *Talip SAN 52931*, 21 Dec 1965 (SAN); Beaufort, Lumat, *Amin SAN 115380*, 22 Feb 1990 (SAN); Keningau, Kepayan FR, *Diwol SAN 80434*, 10 Mar 1976 (SAN); Tawau, Kalabakan, *Fidilis SAN 91376*, 16 Nov 1979 (SAN); Lahad Datu, Ulu Segama FR, *Madani SAN 108588*, 11 Mar 1985 (SAN); Beaufort, Binsulok, *Mat-Salleh K. Mat Salleh 1479*, 22 Sep 1987 (SAN).

25. *Lepeostegeres lancifolius* (Tiegh.) Danser

This species is very distinctive from others in the genus because of the quadrangular stems that bear acuminate-acute leaves and corolla lobes that are reflexed at the 4/5 point of the tube. The leaves are usually tan- to rust-coloured below. The midrib is faintly to strongly darkened. Leaf venation is obscure in this species unlike that of *L. centiflorus* which has visible lateral veins on the lower leaf surface. The darkened midrib and margins of leaves are due to the production of dense, rusty-coloured trichomes/scales. The lowermost bracts of the inflorescence have a dorsal pale patch that contrasts with the otherwise darker pigmentation of bracts. *Lepeostegeres lancifolius* appears to be limited to low elevations in the eastern part of the state.

Elevational range: 150–520 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Tawau, Tawau Hill Park, *Fidilis SAN 88210*, 3 Feb 1978 (SAN); Tawau, Luasong, *Fidilis SAN 89839*, 12 Jul 1979 (SAN); Kinabatangan, Bkt. Tawai, *Mansus SAN 108486*, 19 Mar 1985 (SAN); Lahad Datu, Bukit Silam, *Meijer SAN 109846*, 3 Jun 1990 (SAN); Tawau, Luasong, *Postar SAN 143527*, 20 Jul 2001 (SAN); Lahad Datu, Bukit Silam, *Madani SAN 145399*, 22 Jun 2000 (SAN); Mile 58 Telupid, Sandakan, *SAN 79467*, 19 May1978 (SAN); Tawau, Ulu Sungai Kinabutan, *Aban SAN 34102*, 15 Feb 1963 (SAN); Beluran, Labuk Sugut, Sungai Ruku Ruku, *Aban SAN 94048*, 6 Aug 1981 (SAN); Sg. Binalik, Telupid, *SAN 111814*, 12 Dec 1985 (SAN); Beluran, Labuk Sugut, Sungai Sasau, *Gambating SAN 107368*, 15 Sep 1984 (SAN); Kinabatangan, Bkt. Tawai, *Ignatius SAN 139984*, 4 Feb 1995 (SAN); Ulu Tungod Forest Reserve Meliau, Beluran, 150 m, *SAN 131142*, 8 Aug 2003 (SAN); Tawau, Luasong, *Fidilis SAN 87347*, 19 Aug 1977 (SAN); Beluran, Labuk Sugut, Sungai Ruku Ruku, *Rahim SAN 95003*, 22 Jun 1982 (SAN); Beluran, Telupid, *Madani SAN 83526*, 23 Jun 1976 (SAN); Lahad Datu, Taliwas, *Bousi, J. SAN 119307*, 3 Aug 1987 (SAN); Tawau, Quoin Hill FR, *Bakar SAN 18535*, 17 Jun 1961 (SAN); Ulu Tongod, along Tensuon River, Telupid XPDC, 520 m, *Dolois,Yabainus, Sinal & Gusili SNP 09842*, 18 Aug 2004 (SNP); Lahad Datu, Gunung Silam, 300 m, *Rimi, Jamili, Dolois & Geofarry SNP 06230*, 13 Sep 1995 (SNP).

Lepidaria

26. *Lepidaria kingii* (King) Danser

This is a new record for the flora of Mount Kinabalu. It is known from two collections in the Poring area as well as Keningau and Kinabatangan. It is likely not commonly collected due to the fact that it grows in the canopy of tall lowland tropical tree species. This gorgeous species produces inflorescences that have an involucre > 50 mm long with 2–8 flowers, each of which has a curved corolla that measures > 60 mm in length. In addition, the leaves may reach 20 cm in length.

Elevational range: around 250 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Ranau, Poring, *Gambating SAN 123587*, 5 Oct 1988 (SAN); Keningau, Crocker Range (National Park), *Fidilis SAN 120557*, 22 Aug 1986 (SAN); Sandakan, Labuk Buaya, *Meijer SAN 23633*, 11 Nov 1960 (SAN); Tawau, TBT, Road side, 250 m, *Dolois SNP 17766*, 10 Jun 2003 (SNP).

27. *Lepidaria puchella* Danser

Material of this species is fairly simple to identify because of the long leaves (> 9 cm) coupled with floral bracts that are recurved at the apex. It appears to be limited to low elevations mostly in the eastern or southern part of the state.

Elevational range: 0–700 m.

SPECIMENS EXAMINED—BORENO. SABAH: Beluran, Labuk Sugut, Sungai Kun Kun, *Aban SAN 97227*, 16 Jun 1983 (SAN); Kinabatangan, Malua FR, *Diwol SAN 129716*, 31 Jul 1990 (SAN); Keningau, Pensiangan Kayu FR, *Asik SAN 136036*, 24 Jul 1992 (SAN); Tawau, Luasong, *Fidilis SAN 87378*, 25 Aug 1977 (SAN); Kinabatangan, Sg. Lokan, *Sigin SAN 97518*, 4 Jul 1983 (SAN); Beluran, Labuk Sugut, Sungai Kaingaran, *Aban SAN 99246*, 15 Jul 1983 (SAN); Sandakan, Sepilok Kabili FR, *Sam SAN 39730*, 14 Oct 1963 (SAN); Sandakan, Sepilok Kabili FR, *Sam SAN 39673*, 23 Sep 1963 (SAN); Sipitang, Mesapol FR, *Sadau SAN 50322*, 18 Mar 1966 (SAN); Kinabatangan, Deramakot, *Aban SAN 66336*, 20 Sep 1984 (SAN); Keningau, *Sumbing SAN 119533*, 23 Jun 1987 (SAN); Sabah, *UM A2617* (SAN); Kinabatangan, Tangkulap, *Aban SAN 93978*, 1 Aug 1981 (SAN); Sandakan, *Singh SAN 39297*, 23 Aug 1963 (SAN); Beaufort, *Mikil SAN 34535*, 21 Mar 1962 (SAN); Tawau, Sungai Serudong, *Bakar SAN 26164*, 6 Sep 1961 (SAN); Beluran, Labuk Sugut, Bidu Bidu FR, *Madani SAN 130607*, 26 Jul 1990 (SAN); Lahad Datu, Bkt. Nicola, *Berhaman SAN 134459*, 26 Feb 1992 (SAN); Sandakan, Sepilok Kabili FR, *Sam SAN 64739*, 9 Aug 1969 (SAN); Sabah, UM A2882 (SAN); Kota Marudu, Bukit Templer, *Shea SAN 76252*, 25 Sep 1972 (SAN); Sandakan, Sepilok Kabili FR, *Singh SAN 22511*, 21 Aug 1960 (SAN); Lahad

Datu, Orchid Plateau, *Talip SAN 71076*, 25 Jul 1970 (SAN); Tawau, Mt. Wullersdorf FR, *Talip SAN 65859*, 25 Jun 1969 (SAN); Keningau, Sapulut FR, Nabawan, *Suali SAN 101361*, 24 Oct 1983 (SAN); Beluran, Ensuan, *Aban SAN 90030*, 29 Feb 1980 (SAN); Nabawan, Pensiangan FR, *Fidilis SAN 110372*, 18 Oct 1985 (SAN); Kinabatangan, Tawai FR, *Fox SAN 70416*, 19 Aug 1970 (SAN); Beaufort, *Talib SAN 84678*, 26 Jul 1977 (SAN); Nabawan, Sapulut, *Fidilis SAN 89895*, 11 Aug 1979 (SAN); Beluran, Telupid, *Aban SAN 91298*, 21 Aug 1979 (SAN); Tawau, Kalabakan, *Fidilis SAN 96483*, 18 Aug 1983 (SAN); Kinabatangan, Gunong Rara FR, *Fidilis SAN 96129*, 27 Jun 1983 (SAN); Keningau, Lanas, *Fidilis SAN 118402*, 15 Oct 1986 (SAN); Kinabatangan, Gunong Rara FR, *Pereira JTP 419*, 2 Apr 1997 (SAN); Keningau, Tulid, *Fidilis SAN 122168*, 22 Sep 1988 (SAN); Nabawan, Pensiangan, *Fidilis SAN 139578*, 29 Aug 1994 (SAN); Beaufort, Haligolat, *Diwol SAN 77600*, 10 May 1973 (SAN); Sandakan, Sepilok Kabili FR, *Lassan SAN 65339*, 15 Jun 1969 (SAN); Lahad Datu, Bukit Silam, *Talip SAN 52765*, 15 Sep 1965 (SAN); Tawau, TBT, Picnic area, *Dolois & Yapok SNP16883*, 3 Mar 2005 (SNP); G. Tawai, Plateau S. of mountain top, 700 m, *Vermeulen J.J. Vermeulen 884*, Nov 1986 (UKMB).

28. *Lepidaria sabaensis* (Stapf) Danser (Fig. 9)

This is, by far, the highest elevation *Lepidaria* species in Sabah where it appears to parasitize *Leptospermum* and *Rhododendron*. The only other high elevation member of Loranthaceae is *Macrosolen flammeus* from which this is easily distinguished by the dense set of imbricate red bracts surrounding the flowers. It has the smallest leaves of the genus and produces 2–8 flowers per inflorescence and the bracts are keeled. Besides Mount Kinabalu, it may also be found on the adjacent Mount Tambuyukon. Corollas are salmon to pink-red below with white to yellow apices.

Elevational range: 1500–3950 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Kota Belud, Kinabalu National Park, *Pereira SAN 47203*, 19 Aug 1964 (SAN); Kota Belud, Kinabalu National Park, *Weber SAN 54718*, 20 Mar 1966 (SAN); Kota Belud, Kinabalu National Park, *Aban SAN 56344*, 19 Oct 1966 (SAN); Kota Belud, Kinabalu National Park, *Weber SAN 54748*, 22 Jul 1966 (SAN); Kota Belud, Kinabalu National Park, *Nais SNP 2704*, 16 Feb 1989 (SAN); Kota Belud, Mount Kinabalu, *Chew RSNB 1099*, 25 Jun 1961 (SAN); Kota Belud, Mount Kinabalu, *Chew RSNB 833*, 13 Jul 1961 (SAN); Kota Belud, Mount Kinabalu, *Stone B. Stone 11356*, 9 May 1973 (SAN); Kinabalu, 8500 ft., *Meng et al. W.K. Meng, C.L. Chan, J. Nais 93-27*, 4 June 1993 (SNP); Kota Belud, Kinabalu National Park, *Watkins SAN 57905*, 5 May 1968 (SAN); Kota Belud, Kinabalu National Park, *Meijer SAN 28573*, (16 Feb 1962SAN); Ranau, Layang Layang, *Lee SAN 69965*, 12 Sep 1983 (SAN); Kota Belud, Kinabalu National Park, *Mikil SAN 46541*, 11 Aug 1964 (SAN); Summit trail, Kinabalu Park, 12,000 ft, *Rimi SNP 05684*, 24 Apr 1994 (SNP); Summit trail, Kinabalu Park, 3950m, *F.L Tan, Helen & Ansow SNP 0684*, 6 July 1982 (SNP); Mt. Tambuyukon, 7,500 ft, *Anthea & Justin SNP 0183*, Jan

1982 (SNP); Summit trail, 7,000ft, *Y.F Lee, Aban & Dewol SNP 69965*, 12 Sep 1983 (SNP); Below Gunting Lagadan Hut, 11,200 ft, *Thomas & Mohd Zalni SNP 0462*, 20 Jan 1983 (SNP); Northern Ridge, Kinabalu, 2,200 m, *Alim SNP 05366*, 4 Apr 1995 (SNP); Summit trail, 3940 m, on Leptospermum tree near Panar Laban, *F. L. Tan, Ansow & Helen SNP 0679*, 6 Jul 1982 (SNP); Kinabalu Natinoal Park, back of Carson's camp, Summit Trail, 9,950m, *F. L. Tan, Ansow & Helen SNP 0678*, 6 July 1982 (SNP); Panar Laban, 11,000 ft, *Anthea & Tan SNP 1606*, 26 Oct 1983 (SNP); 11,000 ft, Gng. Kinabalu, Feb. 1974, *Rahim A. Rahim 277* (UKMB); Kinabalu, 9-10,000ft., *Sato* T. Sato 0780, 26 Jul 81 (UKMB); Mount Kinabalu 3140 m, *Sato T. Sato 1447*, Oct 1981 (UKMB).

Loxanthera

29. *Loxanthera speciosa* Blume

This appears to be an exceedingly rare species in Sabah and is known only from two collections by the Clemenses (Beaman et al. 2001) and one from SAN. However, the lovely long pink flowers are distinctive in the family and it is not easily confused with any other. No hosts were recorded.

Elevational range: not recorded.

SPECIMEN EXAMINED—BORNEO. SABAH: Beluran, Labuk Sugut, Kampung Baba, *Gambating SAN 90046*, 3 Mar 1980 (SAN).

Macrosolen

This genus is relatively easy to separate from others in Loranthaceae because of the 6-merous flowers subtended by 3 bracts on plants with opposite leaves. However, variability in leaf morphology makes distinguishing between species in Sabah difficult. In addition, unless mature flowers are collected, many species cannot be reliably identified because accurate corolla length must be determined. Thus, fruiting specimens are listed as "indet." below. Unfortunately, *Macrosolen* individuals are commonly collected in fruit or when flowers are immature.

30. *Macrosolen acunae* (Merr.) Danser

In Sabah, this species is distinctive due to its large sessile leaves that are associated with long corollas. The leaves tend to appear tan in colour and have venation obvious on both surfaces and flowers in the 50 mm range when mature with very short pedicels (1–2 mm). However, in general, the leaves of our specimens are not as large as those reported for this species in Barlow (1997). In Sabah, material has leaves that range 13–21 cm long by 5–8.5

cm wide. Because the leaves are sessile the material cannot be referred to *M. × tubiflorus*. Vegetatively, the plants fit *M. beccari*, but the floral lengths are too long for that species and the anther to filament proportions are out of the recorded range. Specimens from Ulu Tongod have leaves even narrower than reported above.

Elevational range: 20–600 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Pitas, Paitan FR, *Jawanting SAN 32779*, 28 Jan 1963 (SAN); Beluran, Labuk Sugut, Lung Manis, *Diwol SAN 118076*, 19 Dec 1985 (SAN); Beluran, Labuk Sugut, *Ismail SAN 70684*, 16 Nov 1984 (SAN); Beluran, Labuk Sugut, *Cockburn SAN 82527*, 17 Oct 1975 (SAN); Beluran, Labuk Sugut, Kiabau, *Gambating SAN 93839*, 8 Jul 1981 (SAN); Beluran, Ensuan, *Aban SAN 94464*, 11 Mar 1982 (SAN); Beluran, Labuk Sugut, Sapi, *Madani SAN 81374*, 6 Mar 1975 (SAN); Beluran, Labuk Sugut, Sungai Ruku Ruku, *Aban SAN 94047*, 6 Aug 1981 (SAN); Kinabatangan, Bukit Tawai, *Mansus SAN 108458*, 15 Mar 1985 (SAN); Beluran, Labuk Sugut, Segaliud Lokan FR, *Majawat SAN 102428*, 11 Oct 1988 (SAN); Sandakan, *Ahwing SAN 43761*, 25 May 1964 (SAN); Beluran, Labuk Sugut, Wonod, *Aban SAN 79414*, 19 Mar 1974 (SAN); Kinabatangan, Sg. Lokan, *Aban SAN 90666*, 6 Nov 1979 (SAN); Beluran, Telupid, *Diwol SAN 71159*, 3 Nov 1971 (SAN); XPDC Telupid, Ulu Tongod, along Seronsong River, *Dolois, Yabainus, Sanail & Gusili SNP 09816*, 17 Aug 2004 (SNP); XPDC TBC, Kambongol river, Kg. Kambizaan, outside TBC, 200 m, *Dolois, Yabainus, Rahimah & Gusili SNP 17348*, 5 Sep 2002 (SNP); XPDC Ulu Tongod, along selongsong river, 600 m, *Dolois, Yabinus, Sinal & Gusili SNP 09801*, 17 Aug 2004 (SNP); Sandakan, Labuk Road FR, *Sigin SAN 56812*, 26 Mar 1984 (SAN); Beluran, Labuk Sugut, Kapoi, *Gambating SAN 90045*, 1 Mar 1980 (SAN).

31. *Macrosolen cochinchinensis* (Lour.) Tiegh. (Fig. 10)

This species tends to be easy to identify in Sabah because it has the shortest flowers in the genus (< 20 mm) that are cream to yellow-orange at the base with a dark red to maroon collar above the wings of the corolla tube. Also, in many of the specimens the leaves are cream or tan colour when dry.

Elevational range: 0–1800 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Kampong Tamparuliyan, Penampang, *Amin SAN 104105*, 22 Oct 1991 (SAN); Sungai Bersanon, Keningau, *Asik SAN 128166*, 9 Aug 1990 (SAN); Kampong Dungkahang, Penampang, *Madani SAN 111264*, 5 Sep 1985 (SAN); Mempakul, Kuala Penyu, *Amin SAN 86453*, 26 May 1985 (SAN); Merungin, Ranau, *Madani SAN 82566*, 13 Nov 1975 (SAN); Bonggaya FR, Beluran, *Aban SAN 81970*, 16 Jul 1975 (SAN); Luasong, Tawau, *Fidilis SAN 101495*, 15 Feb 1984 (SAN); Mount Kinabalu, Kota Belud, *Chew RSNB 2774*, 5 Sep 1961 (SAN); Sungai Damit, Beaufort, *Amin SAN*

(Above left and right) **Fig. 9.** *Lepidaria sabaensis* is one of the highest elevation mistletoe species in Sabah and is distinguishable by its few-flowered inflorescence with keeled bracts. **Fig. 10.** *Macrosolen cochinchinensis* has short cream-coloured flowers making it easily distinguishable from all others in the state. (Below left and right) **Fig. 11.** *Macrosolen flammeus* is most likely to be found at high elevations on Mount Kinabalu and usually produces a few-flowered inflorescence. **Fig. 12.** *Macrosolen jamilii* shown here with flower buds and thickened reddish leaves from near the summit of Mount Tambuyukon (*SNP 14403*).

103281, 21 Nov 1986 (SAN); Labuk Sugut, Telupid, Beluran, *Madani SAN 75380*, 28 Jul 1972 (SAN); Marintaman FR, Sipitang, *Amin SAN 115649*, 19 Oct 1988 (SAN); Keningau, *Fidilis SAN 119573*, 26 Jun 1987 (SAN); Sook, Keningau, *Diwol SAN 80784*, 18 May 1976 (SAN); Bambangan, Ranau, *Gambating SAN 118102*, 17 Jun 1987 (SAN); Mamut Copper Mine, Ranau, *Aban SAN 66842*, 8 May 1970 (SAN); Sepilok Kabili FR, Sandakan, *Meijer*

SAN 28457, 24 Nov 1961 (SAN); Bukit Silam, Lahad Datu, *Shea SAN 74863*, 28 Feb 1972 (SAN); Bukit Templer, Kota Marudu, *Shea SAN 76298*, 28 Sep 1972 (SAN); Siaungau FR, Beaufort, *Jumatin SAN 72532*, 17 Feb 1973 (SAN); Babagon, Penampang, *Diwol SAN 77464*, 15 Mar 1973 (SAN); Gunung Trus Madi, Tambunan, *Mikil SAN 44322*, 27 Oct 1964 (SAN); Pahu, Tuaran, *Soinin SAN 101918*, 13 Oct 1989 (SAN); Tambunan, *Soinin SAN 124958*, 19 Oct 1989 (SAN); Sungai Mera, Lahad Datu, *Aban SAN 55381*, 17 Apr 1966 (SAN); Gunong Lumaku, Sipitang, *Karim SAN 78488*, 8 Mar 1975 (SAN); Beaufort, *Madius SAN 50053*, 14 Oct 1965 (SAN); Sungai Keramatoi, Keningau, *Sumbing SAN 121895*, 13 Jan 1988 (SAN); Tamparuliyan FR, Penampang, *Amin SAN 115587*, 24 Feb 1988 (SAN); Bukit Silam, Lahad Datu, *Bousi SAN 120760*, 31 Jul 1987 (SAN); Hamadon, Bundu Tuhan, 1,200 m, *T.J Barkman SNP 19064*, 30 Jun 2004 (SNP); Tambunan, Gunung Alab substation, 1,800 m, *Dolois, Rimi, Hendry & Gusili SNP 13635*, 6 Jul 2006 (SNP); Kg. Nalumad, *Andau PEK-D. Andau 204*, 22 Jun 1995 (SNP); Long Pa Sia, Sipitang, *Lamb MTED 427*, 29 Jun 1997 (SAN); Tenompok, road to Bundu Tuhan, 1500m, *Beaman J.H. Beaman 10526*, 7 Jul 1984 (UKMB); KK-Tambunan Rd, 1700-1800 m, *Beaman J.H. Beaman 6887*, 4 Sep 1983 (UKMB); Kampong Kilimu, Ranau, *Madani SAN 89507*, 24 Nov 1978 (SAN); Kg. Lubah, *Maidum, M. Lais 42*, 6 Nov 1997 (SNP); Ulu Liawan, Keningau, 300 m, *Geofarry, Beneditct, Gusili, Handry & Micheal SNP 07427*, 6 May 1996 (SNP).

32. *Macrosolen flammeus* Danser (Fig. 11)

This species is quite distinctive in Sabah due to its few-flowered inflorescence and small leaves. Also, it is the only species that is commonly found above 2600 m. Although it is commonly found on Mount Kinabalu, specimens have also been collected from Gunong Alab. Most of our specimens have leaves turning pale to more commonly dark chocolate when dry. Flower buds are red below, with a black neck and five black lines extending up towards the greenish-white apices. The ovary is bright yellow green that contrasts sharply with the corolla. It appears to primarily parasitize *Phyllocladus*.

Elevational range: 1800–3600 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Kota Belud, Mount Kinabalu, *Chew RSNB 910*, 20 Jul 1961 (SAN); Tuaran, Gunong Alab, *Madani SAN 119259*, 18 Sep 1987 (SAN); Kinabalu, 8500 ft, *Meng et al. W.K. Meng, C.L. Chan, J. Nais 93-28*, 4 Jun 1993 (SNP); Kota Belud, Mount Kinabalu, *Chew RSNB 858*, 17 Jul 1961 (SAN); Kota Belud, Mount Kinabalu, *Watkins SAN 57902*, 5 May 1968 (SAN); Kota Belud, Mount Kinabalu, *Kitayama UKMS 3873*, 11 Jul 1984 (SAN); Mt. Kinabalu, 10,000 ft, *Gordon Smith & Charles S. SNP 0700*, 25 Apr 1981 (SNP); Mt. Kinabalu, Northern Ridge, 3,200 m, *Alim & Benedict SNP 05394*, 6 Apr 1995 (SNP); Gng. Kinabalu, 11,000 ft, *Rahim A. Rahim 277*, Feb. 1974 (UKMB); Tambunan, Gng. Alab, 1800 m, *Beaman J.H. Beaman 8054*, 23 Dec 1983 (UKMB); Kinabalu, *Syafei 0160*, 1973 (UKMB).

33. ***Macrosolen formosus*** (Blume) Miq.

This few-flowered species has long corollas (> 50 mm) and is most likely to be mistaken for *M. × tubiflorus*, yet it has fewer flowers and keeled bracts.

Elevational range: 360–1600 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Tawau, Tawau Hill Park, *Jamnicky VLJ 28*, 28 Feb 2000 (SAN); Tawau, Kalabakan, *Fidilis SAN 79238*, 7 Feb 1977 (SAN); Danum Valley, Lahad Datu, 600 m, *SAN 112344*, 27 May 1986 (SAN); Kinabatangan, Gunong Rara FR, *Shea SAN 75744*, 20 Apr 1972 (SAN); Tawau, Luasong, *Phillipps SAN 89090*, 9 Aug 1978 (SAN); Nabawan, Pensiangan, Sungai Saburan, *Madani SAN 114456*, 28 Jun 1986 (SAN); Lahad Datu, Danum Valley, *Pereira JTP 203*, 19 Apr 1995 (SAN); Sipitang, Sungai Tamaki, *Lim SAN 143318*, 14 Apr 2000 (SAN); Nabawan, Pensiangan, Sungai Tibow, *Fidilis SAN 105272*, 20 Jul 1984 (SAN); Sipitang, Meligan Range, Kg. Ibul, 20 km dari SFI Mondolong station towards Meligan, 1100-1200m., *S. Akin 114*, 22 Aug 1988 (UKMB); Tawau, Tawau Hill, base camp, *Latiff A. Latiff 3391*, 29 Nov 1989 (UKMB); Crocker Range Park, *Rimi, Gofarry, Rahimah, Johny, Hendry & Masius SNP 07085*, 13 Feb 1996 (SNP).

34. ***Macrosolen jamilii*** T.J.Barkman, Repin, & Sugau, **sp. nov.** (Fig. 12)

This species is related to *M. × tubiflorus* but differs in having coriaceous leaves with a recurved margin and a corolla measuring 20 to 26 mm long (*M. × tubiflorus* has thin leaf blades that are not recurved and corollas measuring 70 to 90 mm long).

TYPE: *Yabainus et al. SNP 12056*, Sabah, Kinabalu Park, Summit of Mt Tambuyukon, 2500 m, 27 Sep 2005 (holotype SNP).

Leaves opposite, lamina broadly ovate to elliptic, 7–13 cm long by 4–8 cm broad, more or less cuneate at the base, petiole 5–7 mm long, blade very thick and coriaceous, recurved at the margin, acute to more commonly obtuse or broadly rounded at the apex, shiny and lustrous above, with a more or less dull luster below, venation pinnate but with lateral veins arcuate. Inflorescences produced at nodes, subtended at base by an involucre of sterile acute bracts, composed of 3–6 opposite pairs of flowers, axis 10–17 mm long, flowers borne on pedicels 1–2 mm long, subtended by 3 bracts, central one up to 3 mm long, sharply acuminate and brown at the tip, the other two of similar length and width, 1–1.5 mm long, rounded at apex, ovary 4–5 mm long with a circular flaring rim at apex, persisting in fruit, green, style extending to tip of anthers, with yellow style and red stigma, corolla 6-merous, 20–26 mm long, winged at middle, 5 mm wide at widest portion with wings, red below, with dark/black band at narrowed neck, with apex white above neck terminated by black tip of bud, and with black stripes connecting the collar and tip, reflexed petals white on inside, anther 3–4 mm

long, free part of filament c. 6 mm long, anthers and filaments yellow. Fruits 4–8 mm long, 4–5 mm wide when dried, persistent style 1–1.5 mm long in fruit even to maturity.

Elevational range: 2400–2500 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Top summit of Mt. Tombuyukon, 2,500 m, *Yabainus, Benedict Gangku, Geofarry & Handry SNP 12056*, 27 Sep 2005 (SNP); Mt. Tombuyukon, 7,500 ft., *Justin SNP 0176*, Jan 1982 (SNP); Mt. Tombuyukon, trail to summit from Kg. Manggis, Jamili, *Alim, Ansow, Dolois, Benedict & Mikeprice SNP 05566*, 11 Mar 1993 (SNP); Between camp III and summit, Mt. Tombuyukon, 2,400 m, *Jamili, Dolois, Benedict, & Sinteyong SNP 4887*, 5 Oct 1990 (SNP); *SNP 0176, SNP 05566, SNP 4887*.

The extremely thickened, red-maroon-coloured leaves of this species separate it from all others. Although other species like *M. flammeus* and even *M. melintangensis* may reach comparable altitudes or even higher, their leaves are not nearly as thick as those of *M. jamilii*. However, the habitat near the summit of Mt. Tambuyukon is extreme ultramafic and although this species is not in direct contact with the substrate, conditions there may be inferred to have selected for its highly sclerophyllous leaves. The floral pigmentation is very similar to *M. × tubiflorus* but floral length and leaf morphology easily separates them. *Macrosolen jamilii* is so far only known from Mt Tambuyukon.

The name honours Dr. Jamili Nais, the first person known to have collected this species from Mt. Tambuyukon and current Director of Sabah Parks.

35. *Macrosolen melintangensis* (Korth.) Miq.

This species is more or less intermediate in flower length between *M. cochinchinensis* and *M. × tubiflorus* in Sabah. Its leaves are also nearly intermediate in size between the two species. Its leaves appear light chocolate or tan colour when dry. No hosts have been recorded.

Elevational range: 500–2000 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Ranau, Sungai Mesilau, *Chew RSNB 4179*, 30 Jan 1964 (SAN); Long Pa Sia, Sipitang Camp at Rekong waterfall, *MTED 426*, 29 Jun 1997 (SAN); Beluran, Labuk Sugut, Telupid, *Majawat SAN 132986*, 14 May 1992 (SAN); Kinabatangan, Bukit Tawai, *Mat-Salleh K. Mat Salleh 3286*, 5 Apr 1994 (SAN); Ranau, Sungai Mesilau, *Chew RSNB 4665*, 11 Mar 1964 (SAN); Ranau, Sungai Bambangan, *Chew RSNB 4376*, 19 Feb 1964 (SAN); Ranau, Sungai Mesilau, *Chew RSNB 4271*, 7 Feb 1964 (SAN); Mt. Tombuyukon between camp 3 and summit, *Jamili Nais, Dolois, Benedict, & Sinteyong SNP 4887*, 5 Oct 1990 (SNP); Marai Parai spur, ridge crest, 7,000 ft, *Anthea SNP 1885*, 13 Feb 1985 (SNP); Power Station, Kinabalu National Park, 1600 m, *Dolois, Benedict,*

Yabainus & Gusili SNP 16590, 6 Nov 2001 (SNP); New Liwagu Trail, *Tan & Anthea SNP 1967*, no date (SNP); Above Mesilau west river, near dam, *Jumaat SNP 2636*, no date (SNP); Kinabalu Park, Bukit Ular Trail, 1,600 m, *Rimi, Geofarry, Rahimah, & Joefredin SNP 07386*, 23 Aug 1995 (SNP); Mount Kinabalu, Summit Trail, Carson Falls, *Handry & Yabainus SNP 10816*, 9 Aug 2005 (SNP); Nepenthes Rajah Trail, Mesilau, *Rimi, Rahimah,Gusili & Ansow SNP 09253*, 16 May 1999 (SNP).

36. *Macrosolen* cf. *retusus* (Jack) Miq.

The specimens we studied had leaves about right in size for this species (3–6 cm by 2–4 cm) but they are acute to rounded at the tip instead of acuminate. The leaves are brownish below and lighter above but the lateral veins are not conspicuous as in the description of *M. retusus*. The pedicels are also too long for *M. retusus*. The high elevation that most specimens were collected from may account for the sclerophyllous nature of these specimens. These collections are all from Mt. Trus Madi.

Elevational range: 1642–2600 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Tambunan, Summit of Mt Trusmadi, 1642 m, *Jamili SNP 05007*, 23 Jan 1992 (SNP); Trus Madi, 1900m, upper montane forest, *Geofarry SNP 16676*, 1 Nov 2001 (SNP); Tambunan, Trus Madi, *Mikil SAN 41862*, 13 Nov 1964 (SAN).

37. *Macrosolen* × *tubiflorus* (Ridl.) Danser (Fig. 13)

This is one of the most commonly collected *Macrosolen* species in Sabah, probably due to the large size and showy nature of the flowers. The only recorded host was Fagaceae. Barlow indicates that this species may be a stabilized hybrid between *M. acunae* and *M. formosus*. Flowers are red below, with dark/black band at narrowed neck, with apex white above neck terminated by black tip of bud, and with black stripes connecting the dark collar and tip. The petals are white when reflexed.

Elevational range: (300) 800–2000 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Kota Belud, Kinabalu National Park, *Mikil SAN 57716*, 13 Mar 1967 (SAN); Sipitang, Sungai Tamaki, *Lim SAN 143334*, 14 Apr 2000 (SAN); Ulu Meligan, Sipitang, 5714 ft, *SAN 144446*, 11 Apr 2002 (SAN); Sipitang, Melingan FR, *Kulip SAN 132793*, 12 Jul 1991 (SAN); Tambunan, Trus Madi FR, *Bousi SAN 124032*, 6 May 1988 (SAN); Kota Belud, Kinabalu National Park, *Aban SAN 60658*, 22 Aug 1967 (SAN); Penampang, Tagudon, *Fidilis SAN 131302*, 6 Sep 1991 (SAN); Kota Marudu, Bkt. Madalon, *Aban SAN 94279*, 19 Nov 1981 (SAN); Kinabatangan, Gunong Lotung, *Cockburn SAN 83265*, 15 May 1976 (SAN); Kota Belud, Mt. Kinabalu, *Cockburn SAN 70102*, 29 Sep 1972 (SAN); Tambunan, Trus Madi FR, *Mikil SAN 41784*, 3 Nov 1964

(SAN); Kota Belud, Kinabalu National Park, *Nais SNP 3582*, 7 Nov 1991 (SAN); Rd. to Kimanis, Crocker Range, 1,000 ft, *Rimi, Gusili, Florina & Johnny SNP 07558*, 20 Jun 1996 (SNP); Pinosuk Plateau, *Anthea, Ansow, Thomas, Tan, Helen, & Tidong SNP 1206*, 13 Dec 1982 (SNP); Kota Merudu, Bukit Madalon, below Trig., *Aban SNP 94279*, 19.11.81 (SNP); Sayap Substation, Kemantis Trail, 900m, *Dolois & Salaikum N. SNP 7678*, 13 Jul 1996 (SNP); KNP, ridge to Gunung Doa, Melangkap Tomis, 1000 m, *Gusili, Rimi, Barkman & Avelina SNP 19642*, 8 Jul 2004 (SNP); Hutan Simpan Komuniti Kiau, Lokos Kogiitan, 1,400 m, *Yabainus, Geofarry, Tisun* SNP 12794, 28 Jun 2006 (SNP); Ranau, Kinabalu Park, *Jamili SNP 12209*, 29 Sep 2005 (K, KEP, L, SAN, SAR, SING); Kg. Melangkap Tomis, 3km dari kampung, *Lugas PEK-L. Lugas 1280*, 16 Nov 1995 (SNP); 4 batu dari Kg. Nalumad, Kawasan Taman, *Andau PEK-D. Andau 921*, 28 Oct 1996 (SNP); route to Kopuakan River, Tombuyukon, 815m, *Dolois SNP 12128*, 26 Sep 2005 (SNP); Sayap, trail to Sg. Lumutuk Besar, 950m, *Latiff A. Latiff 3841*, 3 Jun 1992 (UKMB); Bukit ampuan, 1100m, *Akin S. Akin 2018* (UKMB); Kota Belud, Mount Kinabalu, *Chew RSNB 70*, 14 Jun 1961 (SAN); Kota Belud, Mount Kinabalu, *Chew RSNB 1036*, 16 Jun 1961 (SAN); Kota Belud, Kinabalu National Park, *Aban SAN 60658*, 22 Aug 1967 (SAN); Ranau, Morou Porou, 910m, *Rimi, Rahimah, Harry, Geofarry, Masius & Gusili SNP 06570*, 24 Aug 1995 (SNP); Kota Belud, Kinabalu National Park, *Sam SNP 4132*, 15 Jan 1992 (SAN); Ranau, Bukit Hampuan FR, *Madani SAN 89397*, 20 Nov 1978 (SAN); Sipitang, Long Pa Sia, *Lamb MTED 62*, 20 Jun 1997 (SAN).

***Macrosolen* indet:**

Keningau, Sook, *Sadau, F. SAN 49601*, 31 May 1965 (SAN); Sipitang, Long Pa Sia, *Lamb, A. MTED 427*, 29 Jun 1997 (SAN); Ranau, Paka, *Gambating SAN 116161*, 23 Aug 1986 (SAN); Beaufort, Montenior, *Talib SAN 86120*, 27 Aug 1980 (SAN); Tambunan, Kampong Mansorulong, *Nordin SAN 85907*, 7 Jul 1978 (SAN); Penampang, Kampong Dungkahang, *Madani SAN 111264*, 5 Sep 1985 (SAN); Beaufort, Membakut, *Talib SAN 84644*, 8 Jul 1977 (SAN); Ranau, Kampong Tentolob, *Madani SAN 92521*, 13 Jun 1980 (SAN); Sipitang, Mengalong FR, *Madani SAN 111412*, 14 Sep 1985 (SAN); Ranau, Kilimu, *Matin SAN 122262*, 27 Aug 1987 (SAN); Kota Belud, Kelawat FR, *Jawanting SAN 41364*, 8 Feb 1964 (SAN); Penampang, Tamparuliyan, *Diwol SAN 80422*, 9 Mar 1976 (SAN); Papar, Sungai Kimanis, *Banang SAN 49355*, 5 Apr 1966 (SAN); Lahad Datu, Orchid Plateau, *Kumin SAN 71093*, 25 Jul 1970 (SAN); Nabawan, Keningau, Sungai Pingas Pingas, *Fidilis SAN 113971*, 17 May 1986 (SAN); Ranau, Badukan, *Gambating SAN 121641*, 23 Jul 1988 (SAN); Penampang, Tamparuliyan FR, *Amin SAN 126485*, 25 Jul 1992 (SAN); Ranau, Kundasang, *Meijer SAN 23496*, 4 Jul 1960 (SAN); Ranau, Bkt. Ampuan, *Meijer SAN 20963*, 8 May 1960 (SAN); Kota Belud, Kinabalu National Park, *Aban SAN 56356*, 21 Oct 1966 (SAN); Kinabatangan, Gunong Lotung, *Madani SAN 124450*, 22 Apr 1988 (SAN); Nabawan, Keningau, *Asik SAN 127565*, 12 Jun 1989 (SAN); Lahad Datu, Ulu Segama FR, *Madani SAN 108599*, 17 Mar 1985 (SAN); Ranau, Kundasang, *Burgess SAN 25161*, 31 May 1961 (SAN); Sandakan, Labuk Road FR, *Sigin SAN 56812*, 26 Mar 1984 (SAN); Tawau, Sungai Serudong, *Bakar*

SAN 26152, 5 Sep 1961 (SAN); Beluran, Labuk Sugut, Sugut, *Cockburn SAN 82527*, 17 Oct 1975 (SAN); Kinabatangan,Tangkulap, *Rahim SAN 92986*, 4 Feb 1982 (SAN); Beluran, Labuk Sugut, Segaliud Lokan FR, *Majawat SAN 125880*, 4 Oct 1988 (SAN); Beluran, Labuk Sugut, Telupid, *Zainudin A.Zainudin 5035*, 11 Apr 1994 (SAN); Tambunan, Trus Madi FR, *Kulip SAN 133199*, 29 Nov 1992 (SAN); Kinabatangan, Gunong Rara FR, *Fidilis SAN 94718*, 30 Mar 1982 (SAN); Beluran, Kuala Sapi, *Johny & Masius SNP 08476*, 12 Oct 1997 (SNP).

Macrosolen notes: While it would not be surprising to find other Bornean species like *M. brevitubus* or *M. platyphyllus* in Sabah, we did not observe any material. Two specimens may represent undescribed species in the state. *Sukup Akin 1114* was collected from Sipitang, Meligan Range. This interesting specimen has rounded thick leaves, 50 mm long flowers and only 4 flowers per inflorescence. *PEK-L. Tadong 408* was collected from near Mt. Kinabalu and has leaves that are obovate, pedicels very short, and lateral veins that are not obvious below.

Scurrula

38. *Scurrula ferruginea* (Jack) Danser (Fig. 14)

This particularly common species is often found parasitizing woody plants in disturbed areas, especially *Citrus*. Differentiating between the two common Sabah *Scurrula* species is challenging on some specimens. *Scurrula ferruginea* possesses a layer of dense long dendritic hairs above a layer of shorter hairs on the corolla. Also, the indumentum of *S. ferruginea* appears more orange in colour compared to the more rusty brown to rusty red-coloured *S. parasitica*. Although distinguishing between the two species may be challenging, the stipitate fruits that are covered in rusty or orange-rusty trichomes makes this genus easy to distinguish from all others in the state. The flowers are zygomorphic.

Elevational range: 0–1500 m.

SPECIMEN EXAMINED—BORNEO. SABAH: Beaufort, Ulu Membakut, *Amin SAN 127109*, 15 Oct 1992 (SAN); Ranau, Bundu Tuhan, *Maikin SAN 131254*, 30 Oct 1990 (SAN); Kinabatangan, Sungai Menanggol, *Majawat SAN 117577*, 21 Feb 1987 (SAN); Kota Belud, Kampong Lebong Lebong, *Maikin SAN 108969*, 7 Aug 1985 (SAN); Beaufort, Siaungau FR, *Amin SAN 126732*, 19 Sep 1992 (SAN); Penampang,Tagudon, *Asik SAN 131379*, 13 Sep 1991 (SAN); Piyas, Pitas, *Gambating SAN 121317*, 13 May 1987 (SAN); Kota Belud, Mount Kinabalu, *Chew RSNB 2614*, 1 Sep 1961 (SAN); Ranau, Tudangan, *Gambating SAN 115987*, 18 Jul 1986 (SAN); Ranau, *Gambating SAN 114249*, 17 Mar 1986 (SAN); Ranau, Badukan, *Gambating SAN 114114*, 18 Feb 1986 (SAN); Beaufort, Brunei, *Amin SAN 102983*, 17 Mar 1986 (SAN); Ranau, Badukan, *Gambating SAN 116068*, 22 Jul 1986 (SAN); Tambunan,

Trus Madi, *Tangah JWT 23*, 10 Mar 1995 (SAN); Kudat, Loro FR, *Sinanggul SAN 51057*, 14 May 1965 (SAN); Beaufort, Lumat, *Talib SAN 84503*, 20 Oct 1976 (SAN); Kota Marudu, Kampong Marak Parak, *Aban SAN 99985*, 16 Aug 1983 (SAN); Penampang, *Gambating SAN 60473*, 23 Jul 1984 (SAN); Pitas, Bengkoka Peninsula FR, *Shea SAN 76090*, 11 Sep 1972 (SAN); Beaufort, Klias FR, , *Diwol SAN 80189*, 23 Aug 1975 (SAN); Ranau, Bundu Tuhan, *Aban SAN 56358*, 22 Oct 1966 (SAN); Ranau, Bambangan, *Gambating SAN 121569*, 8 Apr 1988 (SAN); Penampang, Kebambangan, *Majawat SAN 128767*, 10 Apr 1990 (SAN);

(Above left and right) **Fig. 13.** *Macrosolen × tubiflorus*. **A**, Habit. **B**, Closer view of inflorescences showing brilliant-red long-tubular flowers with reflexed white corolla lobes. (Below left and right) **Fig. 14.** *Scurrula ferruginea* is distinctive due to its dense rusty-coloured tomentum covering flowers, fruits and vegetative portions of the plants. **Fig. 15.** *Taxillus chinensis* is one of the most abundant mistletoe parasites in Sabah and is easily recognized by its 4-merous flowers and warty fruits.

Beluran, Labuk Sugut, Mamahat FR, *Jawanting SAN 32691*, 1 Dec 1962 (SAN); Beluran, Labuk Sugut, Sungai Tahid, *Gambating SAN 67306*, 18 Jan 1985 (SAN); Ranau, Kampong Takutan, *Shea SAN 77140*, 23 May 1973 (SAN); Beaufort, Maraba, *Karim SAN 80293*, 8 Nov 1975 (SAN); Ranau, *Soinin SAN 129105*, 26 Jul 1989 (SAN); Beluran, Bonggaya FR, *Kodoh SAN 82013*, 22 Jul 1975 (SAN); Papar, Ulu Kimanis, *Diwol SAN 80496*, 24 Mar 1976 (SAN); Ranau, Merungin, *Madani SAN 82608*, 17 Nov 1975 (SAN); Kudat, Pulau Malawali, *Diwol SAN 89966*, 25 Mar 1979 (SAN); Ranau, Kampong Tentolob, *Madani SAN 92512*, 11 Jun 1980 (SAN); Ranau, *Gambating SAN 109363*, 13 Jun 1985 (SAN); Kinabatangan, Kuala Meruap FR, *Aban SAN 107470*, 8 Nov 1984 (SAN); Beaufort, Lumat FR, *Amin SAN 102721*, 22 Oct 1986 (SAN); Ranau, Badukan, *Gambating SAN 118276*, 24 Jul 1987 (SAN); Kota Marudu, Bukit Templer, *Shea SAN 76288*, 28 Sep 1972 (SAN); Ranau, Mamut Copper Mine, ? *SAN 74029*, 25 Aug 1971 (SAN); Beaufort, Lumat, *Diwol SAN 77910*, 10 Sep 1973 (SAN); Ranau, Pinosok, *Gambating SAN 121629*, 22 Jul 1988 (SAN); Ranau, Pinosok, *Gambating SAN 116146*, 21 Aug 1986 (SAN); Kota Belud, roadside, Kg. Taginambur to Kg. Bongol, *Dolois, Duni & Gusili SNP 15576*, 5 Sep 2000 (SNP); Kota Marudu, Kg. Kias, Kias and Kanarem rivers confluence, *Bakia PEK-A. Bakia 48*, 26 May 1994 (SNP); Giman, Kg. Himbaan, Bundu Tuhan, *Soibeh PEK-D. Soibeh 622*, 19 Dec 1993 (SNP); Kg. Takutan, *Tadong PEK-D. Tadong 196*, 8 Aug 93 (SNP); Kiau Nuluh, *Duaneh PEK-J. Duaneh 39*, 18 Sep 1992 (SNP); Kg. Takutan, *Tadong PEK-D. Tadong 581*, 17 Dec 1993 (SNP); Kg. Sayap, *Surunda PEK-Y. Surunda 9*, 4 Mar 1995 (SNP); Kg. Sorinisim, Tepi Jalan, *Sibil PEK-J. Sibil 159*, 15 Mar 1993 (SNP); Kiulu, along trail to waterfall 30m, *PUA 017*, 6 Sep 1987 (UKMB); Kuala Penyu, Rd to Kg. Tanjung Aru, *Rimi, Dolois, Hendry, Benedict & Robert SNP 06618*, 26 Jul 1995 (SNP); Rd. to Melangkap Kapa, *Anthea SNP 1949*, 19 Nov 1984 (SNP); Bundu Tuhan, parasitic on old pumelo tree, 4,500ft, *Anthea, Ansow, & Lucas SNP 3404*, 9 Jul 1987 (SNP); Rangkam, Bundu Tuhan, 1,100m, *T.J Barkman SNP 15595*, 22 Sep 2000 (SNP).

39. *Scurrula parasitica* L.

This species has flowers that are narrower with a straighter tube, and often darker red-brown than *S. ferruginea*. In general, specimens of this species are less hairy than those of *S. ferruginea*.

Elevational range: 400–1050 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Keningau, Sungai Keramatoi, *Sumbing. SAN 121945*, 19 Jan 1988 (SAN); Keningau, Tulid, *Nordin SAN 85806*, 22 Jul 1977 (SAN); *Meijer SAN 55020*, 1964 (SAN); Nabawan, Bkt. Pisagan, *Fidilis SAN 127647*, 21 Jun 1989 (SAN); Nabawan, Pensiangan, Penantaman, *Asik SAN 131478*, 10 Jul 1991 (SAN); Nabawan, Bkt. Pisagan, *Fidilis SAN 139396*, 18 Feb 1995 (SAN); Sandakan, Ulu Dusun, *Mikil SAN 35779*, 5 Apr 1963 (SAN); Nabawan, Pandewan, *Asik SAN 120100*, 12 Mar 1987 (SAN); Keningau, Ulu Sungai Punteh, *Fidilis SAN 125403*, 21 Feb 1989 (SAN);

Tenom, Melalap, *Sumbing SAN 139183*, 6 Jul 1995 (SAN); Ranau, Bkt. Ampuan, *Madani SAN 89496*, 22 Nov 1978 (SAN); Beluran, Labuk Sugut, Telupid, *Aban SAN 93961*, 31 Jul 1981 (SAN); Tenom, Ulu Sungai Tomani, *Madani SAN 90840*, 13 Jun 1979 (SAN); Kinabatangan, Pinangah FR, *Sumbing SAN 110203*, 18 Sep 1985 (SAN); Keningau, Sg. Pingas Pingas, *Sumbing SAN 110883*, 11 Mar 1985 (SAN); Kinabatangan, Gunong Lotung, 10 May 1976, *Aban SAN 83170* (SAN); Tenom, Mandalom FR, *Asik SAN 136126*, 16 Aug 1993 (SAN); Tambunan, Trus Madi, *Sugau JBS 157*, 10 Mar 1995 (SAN); Keningau, Tulid, *Sumbing SAN 122183*, 24 Sep 1988 (SAN); Papar, Mandahan, *Talib SAN 80670*, 20 Jul 1976 (SAN); Tawau, Outside Taman Bukit Tawau, Bukit Bombalai, *Dolois & Handry SNP 12519*, 13.1.2006 (SNP); Long Pasia, 1000m, *Dolois, Handry, Harry, Geofarry, Johny, Pius, Tisun, Gusili & Willson MTED 378*, 27.6.97 (SNP); Kg. Poring, *Sambuling PEK-S. Sambuling 103*, 13 Dec 1993 (SNP); 400m dari balai raya Melangkap Tomis, *Lugas PEK-L. Lugas 855*, 15 Aug 1995 (SNP).

Taxillus

40. *Taxillus chinensis* (DC.) Danser (Fig. 15)

This species is frequently found along roadsides and disturbed situations. The usually paired flowers and tuberculate fruits make this species relatively easy to recognize. The zygomorphic flowers are 4-merous and green outside with reddish hues inside of the tube. The corolla in bud has a swollen knob at the apex and is constricted at the summit of the ovary. Although it could be confused with *Scurrula*, the non-stipitate fruits of *Taxillus* allow it to be separated from that genus even on a depauperate specimen. The only recorded host was *Melastoma* although casual observation along roadsides in Sabah indicate that it parasitizes a wide range of species.

Elevational range: 0–2000 m.

SPECIMENS EXAMINED—BORNEO. SABAH: Kudat, Tg. Panbatu, *Stone SAN 86810*, 12 Apr 1977 (SAN); Kota Belud, Kinabalu National Park, *Mikil SAN 38658*, 13 Jul 1963 (SAN); Ranau, Kilimu, *Matin SAN 122233*, 24 Aug 1987 (SAN); Ranau, Bkt. Ampuan, *Madani SAN 89470*, 21 Nov 1978 (SAN); Kota Belud, Kinabalu National Park, *Chow SAN 76403*, 26 Sep 1972 (SAN); Tambunan, *Nooteboom H.P. Nooteboom 1309*, 16 Mar 1969 (SAN); Ranau, Mark Pang, *Gambating SAN 110532*, 24 Jul 1985 (SAN); Penampang, Tagudon, *Fidilis SAN 113780*, 17 Jul 1986 (SAN); Papar, Kimanis, *Fidilis SAN 120570*, 23 Aug 1986 (SAN); Ranau, Badukan, *Gambating SAN 116071*, 22 Jul 1986 (SAN); Tambunan, Pinawantai, *Shea SAN 76768*, 5 May 1973 (SAN); Sandakan, Leila FR, *Kodoh SAN 83688*, 16 Apr 1977 (SAN); Keningau, Crocker Range (National Park), *Diwol SAN 83997*, 13 Nov 1976 (SAN); Ranau, Kampong Tentolob, *Madani SAN 92504*, 11 Jun 1980 (SAN); Sandakan, Sungai Mayan, *Stevens P. Stevens et al. 382*, Jan 1976 (SAN); Tambunan, Kirokot, *Maikin SAN 56031*, 9 May 1984 (SAN); Ranau, Sungai Bambangan, *Chew RSNB 4632*, 3 Mar 1964

(SAN); Sandakan, Sepilok Kabili FR, *Meijer SAN 24766*, 26 Jul 1961 (SAN); Sandakan, Sibuga, *Bakar SAN 27710*, 3 Oct 1961 (SAN); Tambunan, Trus Madi FR, *Madani SAN 74431*, 30 Oct 1971 (SAN); Ranau, Tudangan, *Gambating SAN 115986*, 18 Jul 1986 (SAN); Ranau, Pinosok, *Gambating SAN 121623*, 22 Jul 1988 (SAN); Tambunan, Gunong Alab, *Sumbing SAN 121706*, 15 Aug 1987 (SAN); Ranau, Sosopodon FR, *Adam, SAN 56369*, Nov 1966 (SAN); Ranau, Sosopodon FR, *Sinanggul SAN 47909*, 19 Dec 1964 (SAN); Kota Belud, Kinabalu National Park, *Sadau SAN 42838*, 19 Feb 1965 (SAN); Tawau, Gemok Hill FR, *Sumbing SAN 103467*, 19 Mar 1984 (SAN); Beluran, Labuk Sugut, Nangoh, *Nawi SAN 55936*, 6 Dec 1983 (SAN); Ranau, Badukan, *Gambating SAN 116071*, 22 Jul 1986 (SAN); Ranau, Paka, *Gambating SAN 123450*, 23 Sep 1988 (SAN); Ranau, Poring, *Gambating SAN 123175*, 12 Apr 1988 (SAN); Kota Marudu, Kampong Marak Parak, *Aban SAN 99961*, 16 Aug 1983 (SAN); Park Headquarters, 5,120 ft, *Thomas Yusuf & Patrick SNP 1120*, 4 Mar 1983 (SNP); Bundu Tuhan, 4,000 ft, *Anthea, Ansow & Lucas SNP 3401*, 9 Jul 1987 (SNP); Rangkam, Bundu Tuhan, 1100 m, *T. J. Barkman SNP 15592*, 22 Sept 2000 (SNP); Kg. Melangkap Tomis, *Lugas PEK-L. Lugas 2774*, 13 Jul 1998 (SNP); 5 km dari Melangkap Tomis, *Lugas PEK-L. Lugas 1027*, 6 Oct 1995 (SNP); Kg. Poring, *Sambuling PEK-S. Sambuling 400*, 11 Aug 1994 (SNP); Kg. Poring, *Sambuling PEK-S. Sambuling 438*, 2 Sep 1994 (SNP); Kg. Poring, *Sambuling PEK-S. Sambuling 467*, 25 Nov 1994 (SNP); Ranau, Bundu Tuhan, *Doinis PEK-D. Soibeh 92*, 11 Feb 1993 (SAN); Kg. Sayap, Kebun Getah, *Surunda PEK-Y. Surunda 5*, 4 Mar 1995 (SNP); Kg. Takutan, *Tadong PEK-L. Tadong 98*, 18 Mar 1995 (SNP); Kg. Poring, 100m dari sungai, *Sambuling PEK-S. Sambuling 666*, 23 May 1996 (SNP); Kg. Takutan, tepi jalan raya ke SMK Timbua, *Tadung PEK-L. Tadung 251*, 30 Mar 1995 (SNP); 2 batu from Kg. Nalumad, *Andau PEK-D. Andau 1031*, 8 Oct 1998, (SNP); Kg. Poring, *Sambuling PEK-S. Sambuling 422*, 28 Aug 1994 (SNP); 1 km dari Melangkap Tomis, *Lugas PEK-L. Lugas 2475*, 9 Jul 1996 (SNP); 0.5 km dari Melangkap Tomis, *Lugas PEK-L. Lugas 87*, 6 Apr 1996 (SNP); Kawasan Melangkap Tomis, *Lugas PEK-L. Lugas 1898*, 17 Mar 1996 (SNP).

Trithecanthera

41. *Trithecanthera superba* Danser

Beaman et al. (2001) report this species from four collections by the Clemenses from three different localities around Mt. Kinabalu, all of which are known from ultramafic substrates and stunted forests: Gurulau Spur, Marai Parai, and Penigupan. With flowers borne singly and strongly reflexed upwards on the inflorescence axis it would not be easily confused with other taxa so perhaps it is locally rare if not extinct since no specimens have been collected since the 1930s.

Elevational range: 1200–3000 (from Beaman et al. 2001).

SPECIMENS EXAMINED: none.

42. *Trithecanthera sparsa*

Barlow (1995) reports that *T. sparsa* has been collected in Sabah (*de Vogel 8202*, Crocker Range; *Wood SAN A3436*) but we did not encounter any specimens.

Elevational range: not known.

SPECIMENS EXAMINED: none.

REFERENCES

Barlow, B.A. (1997a) Loranthaceae. *Flora Malesiana* I, 13: 209-401.

Barlow, B.A. (1997b) Viscaceae. *Flora Malesiana* I, 13: 403-442.

Beaman, J.H., C. Anderson & R.S. Beaman (2001) *The Plants of Mount Kinabalu. 4. Dicotyledon Families Acanthaceae to Lythraceae*. Natural History Publications (Borneo), Kota Kinabalu, in association with Royal Botanic Gardens, Kew.

Beaman, J.H. & C. Anderson (2004) *The Plants of Mount Kinabalu. 5. Dicotyledon Families Magnoliaceae to Winteraceae*. Natural History Publications (Borneo), Kota Kinabalu, in association with Royal Botanic Gardens, Kew.

Chua, L.S.L. (1996) Santalaceae. *Tree Flora of Sabah and Sarawak* 2: 257–262.